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Article XXV.—*On Gillenia Trifoliata. By R. Egles-feld Griffith, M.D.*

Nat. Ord. Rosaceæ.
Sex. Syst. Icosandria Pentagynia.

Gillenia. *Calyx*, subcampanulate, border 5-toothed. *Corolla*, partly unequal. *Petals*, 5, lanceolate, attenuated, coarctate at the claws. *Stamina*, fewer, included. *Styles*, 5, contiguous; stigmas, capitate. Capsule, 5-celled; cells, 2-seeded.—*Nuttall.*

G. trifoliata. *Leaves*, ternate; upper folioles lanceolate, serrate, subequal; lower folioles obtuse, with an abrupt, acute termination. *Stipules*, linear, entire. *Flowers*, terminal, loosely paniculated, 5-gynous; petals linear-lanceolate, obtuse. *Calyx*, tubulose, campanulate, ventricose. *Stamina*, included. *Capsule*, 5-celled, many-seeded.

Synon. *Filipendula foliis ternatis.* Gron. Virg. 55. Hort. Cliff. 191. Hort. Upsal. 131.

Ulmaria major trifolia, flore amplo pentapetalo virginiana. Pluk. Alm. 393. t. 236. f. 5. Ray. Sup. 330.

Ulmaria virginiana trifolia, floribus candidis amplis longis et acutis. Moris. Hist. 3. p. 325.

Spirea trifoliata. Lin. Sp. pl. Willd. 2. p 1063. Michaux. 1. p. 294. Pursh. Fl. am. bor. 1. p. 294, &c.

Gillenia trifoliata. Moench. Nuttall, Gen. 1. p. 337. Barton. comp. Flor. Phil. 1. 230.

Icon. Barton. Mat. Med. U. S. 1. t. 5. Curtis Bot. Mag. 489. Miller. Dict. t. 256. Bigelow, Am. Med. Bot. t. 41.

Common names. Indian Physic. Ipecacuanha. Indian hippo. Dropwort, Meadow sweet. Bowman's Root, &c.

Pharm. Gillenia, U. S. Pharm.

Officinal. Root. Numerous slender roots radiating from a thick tuber, brown, annulated or knotted. Taste bitter and nauseous. Smell nauseabond, like that of ipecacuanha.

Description. Root perennial, composed of a great number of slender brown caudexes which arise in a radiated form, from a dark brown amorphous tuber. Some of these caudexes or fibres are very long and are knotted, or annulated for a considerable portion of their length, giving these roots somewhat the appearance of those of the true Ipecacuanha. The number of stems varies much, there sometimes being only one, and at others many, arising from the same root. These stems are branched above, and are about two to three feet in height; they are usually of a reddish or brownish colour. The leaves are all ternate, the upper leaflets lanceolate, serrate and nearly equal; the lower ones broader towards the apex, but terminating abruptly in an acute point. The stipules are linear and entire, but never subulate. The flowers are disposed in a terminal loose panicle, and are composed of five lanceolate-linear petals, somewhat obtuse and subunguiculate at their junction with the calyx. They are generally of a white colour, though it is by no means uncommon to find them of a rose tint. The flower buds are almost universally of a rose red colour. The calyx is tubular, campanulate, and somewhat inflated, terminating in five sharp segments. The stamens are about twenty in number, inserted on the calyx and included; the anthers are small. The styles are five, with obtuse stigmas. The capsule is five-celled, connate, at the base unilocular, each cell containing two seeds.

Habitat. This species of Gillenia is found from Canada to

Florida on the east side of the great Alleghany ridge, generally occurring in hilly woods, in light gravelly soil; in the neighbourhood of Philadelphia it is by no means uncommon in certain localities. It begins to flower towards the latter end of May, continuing in inflorescence for about a month, ripening its seeds in August. It is well deserving of cultivation, not only on account of its medicinal properties, but also as an ornament to the flower garden. It may be readily propagated either by parting its roots or from seed; if the latter mode be adopted, the seed should be sowed as soon as they are ripe; by this plan a year is gained, for if they be sowed in the spring, they will seldom germinate till the succeeding year, and frequently totally fail. The young plants must be kept free from weeds, and set out in the autumn, about the time the leaves begin to decay. The situation in which they succeed best, is a shady border of light but rich earth.

Botanical History. The Gillenia early attracted the attention of the describers of American plants, and has been subjected to various changes of nomenclature, in common with the genus Spirea, with which it was for a long time united. Moench, however, proposed the formation of the present genus many years since, though it has only been within a recent period that botanists have assented to its propriety. It differs from Spirea in having the stamens included instead of exserted; in the capsule being uniformly five-celled, with the cells two-seeded, whilst in Spirea the seed vessel is two-celled and one-seeded. It is exclusively a North American genus, and consists of but two species, that under consideration and *G. stipulacea*, which replaces it to the westward of the mountains, and is distinguished by having the lower leaves pinnatifid, the upper ones trifoliate; folioles lanceolate, incised, serrate; stipules foliaceous, oblique and jagged. It is rare in limestone and alluvial regions, but is very common in hilly and sandstone districts, always preferring poor and gravelly soils. It blossoms in June and July. It closely resembles the *trifoliata* in its sensible properties, but is said to be more certain in its effects, and also

that it does not deteriorate by cultivation, which some circumstances would lead to a belief is the case with the *trifoliata.*

Medical History. The medical properties of the Gillenia were known to the aborigines, who were in the habit of prescribing it as an emetic of known and certain efficacy, long before their acquaintance with the whites. It is a curious fact, connected with the history of our vegetable materia medica, and is certainly somewhat humiliating to our claims of superior knowledge, that there is scarcely any native plant possessed of sanative powers with which the aboriginal inhabitants of the country were not well acquainted, whilst few, very few, vegetable remedies have been the result of scientific research. It is true that tradition and general opinion attributed marvellous powers to a number of plants, which experiment and analogy have shown to be inefficient and useless, such as the variety of Rattlesnake weeds, the specifics for the cure of hydrophobia, &c. Shoepf, who appears to have been impressed with an idea that every vegetable production of the new world was necessarily possessed of remedial virtues, as may readily be supposed, has not overlooked the Gillenia. He lauds it in the highest terms, considering it as a complete substitute for the South American root, though it requires to be administered in larger doses. Its properties were also known to Linnæus, who speaks of its reputed powers as somewhat extraordinary in a plant belonging to his natural order of *Senticosæ.* "Spiræam trifoliatum; ipecacuanham vocant et vomitum facere dicunt quod sane singulare esset in hoc ordine." From a well founded opinion of its emetic properties, it has been admitted into all our dispensatories, and is also recognised by the U. S. Pharmacopœia.

Medical Properties. The root of the Gillenia, which is the active portion of the plant, is a safe and efficacious emetic in about the same doses as Ipecacuanha. In smaller quantities it is said to act beneficially as a gentle tonic, especially in that torpid state of the stomach accompanying some forms of dyspepsia. The use of the Gillenia as an emetic, is not confined

to practitioners, but is constantly resorted to in domestic practice in many parts of the country. The usual mode of taking it is in the form of an infusion, of which a small tea-cupfull is swallowed every half hour, until emesis is produced. Until very lately there was no doubt entertained of the activity of this medicine; but an essay of Dr Baum's,* founded on actual experiments, having shaken the faith of many practitioners as to the utility of retaining this article in the materia medica, requires that we should examine the proofs adduced with more detail. For this purpose we shall first give an abstract of Dr Baum's communication, and then succinctly state some of the evidence on the other side.

Dr Baum prepared from the cortical portion of the root a powder, an extract, a vinous tincture and a watery solution, to which he appears to have given a fair trial on a number of patients with the following results:

Powder, in small quantities, produced little or no effect, and even in doses of one hundred to one hundred and fifty grains, caused very ineffectual vomiting; when combined with tartar emetic, no increase of the activity of the latter article was obtained.

Extract, &c. These, even in the largest doses, Dr Baum found to be perfectly inert.

The same experimenter also made a trial of the Gillenia as a tonic, "commencing with a small quantity and increasing it to one drachm every two hours. To give it a full and perfect trial, I continued the article in some cases two weeks, though without any advantage."

From these experiments, it would certainly seem that the Gillenia has been admitted on far too slender grounds to a distinguished position in the American materia medica, and is in reality an inert article, which should be expunged from the list: we, however, do not think that Dr Baum's experiments are sufficient to induce us to reject an article which has receiv-

* Philad. Journ. Med. and Phys. Science, vol. v. p. 15.

ed the united testimony of the members of the profession, who speak of it in the highest terms, and recur to its use with as much confidence as to the true Ipecacuanha. Nothing in the present state of our knowledge is more wanted than a well conducted course of experiments on the various therapeutic agents habitually employed. To be complete, however, these experiments would require a devotion to the subject which few are willing or able to bestow on them. The article should be administered in its simplest form to healthy persons, whose age, temperament, sex, idiosyncracy and diet are carefully noted, and the primary and secondary effects noted. After these trials have been been repeated, and the phenomena produced clearly ascertained, the doses, preparation, and the channel by which the substance is introduced into the system, should be varied. It should then be tried on individuals of different physiological conditions; and finally, its real therapeutic powers be sought for, by commencing its use in simple but well marked diseases, whose seat and intensity can be readily ascertained; and afterwards the inquiry extended to such as are more complicated. Such a course of experiments, it is obvious, would be laborious and difficult, but the influence it would have on the medical art would be incalculable, and the practitioner who would thus determine the real value of any one article of the materia medica, would confer greater benefits on science and humanity, than by the addition of a host of new substances to our present therapeutic agents.

Opposed to the experiments of Dr Baum, we have general opinion, and what is of far more value, the concurrent testimony of a number of distinguished members of the medical profession, that the Gillenia is not only possessed of emetic qualities, but also that it is endowed with them in no slight degree. We have already noticed the opinions of Shoepf and Linnæus, and that of the compilers of our Dispensatories and Pharmacopæias; to these may be added the following, which we deem amply sufficient, without extending the limits of this essay in too great a degree.

Dr B. S. Barton observes, "I can speak with more confidence of the Spiræa trifoliata. It is a safe and efficacious emetic in doses of about thirty grains. Along with its emetic, it seems to possess a tonic power."* This opinion is confirmed by Dr W. P. C. Barton, who adds, that country people have frequently used the plant so incautiously, as to be under the necessity of resorting to medical aid.†

Dr Eberle states, "from my own experience with this plant, which has not been inconsiderable, I am led to regard it as very little inferior to the officinal Ipecacuanha as an emetic. Like this latter article, it is a safe and efficacious vomit. While practising in Lancaster county, I employed this plant very frequently as an emetic, in the treatment of intermittent and bilious fevers, and it very seldom disappointed me of the desired effect."‡

Dr Zollickoffer also says, that from a trial he made of it, he found it was mild and efficacious in its operation.§

Professor Bigelow, in speaking of this plant, gives it as his opinion that it possesses properties analogous to the Ipecacuanha; it must, however, be also stated, that be adds, it requires a larger dose, and that he has not been satisfied that it is certain in its operation.‖ We might quote a variety of additional authorities in support of the emetic powers of this substance, but the above are sufficient to show that Dr Baum's failures with it were owing in all probability to some fortuitous circumstance. The parcel of roots which he employed, might have been deteriorated by age, or have been obtained from cultivated plants, both of which circumstances are said to have a very detrimental influence on its medicinal powers. But even granting that the article he used was good, it ought to require more than one set of experiments, with similar results, to induce us to eliminate an article from our materia medi-

* Collections for an Essay towards a Mat. Med. of the U. S. p. 27.
† Veg. Mat. Med. U. S. vol. 1, p. 69.
‡ Mat. Med., &c. vol. 1. p. 67.
§ Mat. Med. U. S. p. 165.
‖ Am. Med. Bot. vol. 3, p. 13.

ca, which has received such high and authoritative praise as the plant under consideration; we were in hopes to have presented at this time the result of a course of experiments made with the powder, and some observations on its active principle, but owing to the derangement of plans caused by the prevalence of the epidemic among us, we have been obliged to postpone them till the next number.

What has been said above in praise of the *G. trifoliata*, applies with greater force to the *G. stipulacea*, which is possessed of more unequivocal powers than the former, and is constantly used in our western states.

Pharm. Preparations and Mode of Administration. The Gillenia may be given either in powder or strong infusion. The former mode, however, is preferable and is generally adopted, the dose, as an emetic, is about thirty grains. When employed as a tonic in dyspepsia, it is to be given in small quantities, two to four grains. United with opium alone, or in the form of Dover's powder, it may be successfully resorted to as a sudorific.

Analysis. It appears that although the whole root is possessed of marked qualities, that it is the cortical portion which is the most active and should be used. The cortex bears a very large proportion to the woody fibre, as from ℥i ℥ij of perfectly clean and dry root, Dr Baum obtained ℥i 13 gr. of cortex.

No complete analysis of the Gillenia has yet been laid before the public. Dr Bigelow states, "that the predominant soluble ingredients in this root appear to be a bitter extractive matter and resin. When boiled in water, it imparts to it a beautiful deep red wine colour, and an intensely bitter taste. This decoction undergoes no change from alcohol or gelatine, though it gives a precipitate with muriate of tin. Water distilled from the root has its peculiar flavour with little of the bitterness. A large portion of resin is precipitated on the addition of water to an alcoholic tincture of the root." From an analysis by Dr Staples, it appears that the active principle of the Gillenia is not emetin.

Article XXVI.—*Note on the Effects of Cantharides subjected to ebullition. By J. Scattergood.*

In consequence of the absorption of the active principle of the Lyttæ, blisters are apt to occasion strangury and bloody urine; it has been a problem, therefore, of some importance, to discover a plan by which such an absorption may be obviated; for this purpose camphor has been recommended to be mixed with the blistering composition, and a piece of thin gauze has been interposed between the plaster and the skin, but it has been found (Paris states in his Pharmacologia) that ebullition in water deprives the Lyttæ of all power of thus acting on the kidneys, without in the least diminishing their vesicating properties.

Dr Theophilus Beasly of this city, in a course of experiments instituted to ascertain the correctness of this statement, has found that if Cantharides in their *unpowdered state* are thrown into water at the boiling point, and boiled for fifteen minutes, they lose the property of producing strangury, and retain that of vesicating unimpaired: if suffered to remain more than seventeen, the latter is affected, and under fifteen minutes do not lose the former. The water in which they are boiled becomes quite dark, and the extract prepared by evaporating it, blisters in the usual time, but whether it produces strangury or not has not been ascertained.

In many trials which Dr B. has made with an ointment prepared with Cantharides treated in this manner, he has never known it to produce strangury except in two or three instances, in all of which the effect might very fairly be attributed to the presence of diseases which are known to produce it, such as dysentery and diarrhœa. Many of the patients on whom it was applied could not use the ointment prepared in the usual way, without being more or less troubled with this painful affection.

It is probable that decoctions of Cantharides in sweet oil, and the oleaginous extracts prepared with Spirits of Turpentine or Ether, mentioned on page 212, vol. 3d of this Journal, may possess similar properties. The subject is one of importance, and well worthy the attention of physicians.

Article XXVII.—*On the Cacoucia coccinea. By R. Eglesfeld Griffith.*

In no part of the world has nature poured out her vegetable treasures with more profusion, than in the tropical regions of America; and under the high and unvarying temperature to which they are there subjected, they become endowed with active qualities which are rarely to be found in the vegetables of more northern climates. Notwithstanding the long list of valuable therapeutic agents which we derive from thence, an immense number still remain to reward the researches of the naturalist. For most of those which now enrich our materia medica we are indebted to the natives; thus, the Cinchona, the Ipecacuanha and the Jalap, were esteemed as remedies of a high order, long before the appearance of Europeans in the western hemisphere. But many, a vast many, still remain, the properties of which, though familiar to individuals, will perhaps be never promulgated to the world except from accident, or a concurrence of fortunate circumstances. Within a comparatively short period, however, medical botany, in common with its sister sciences, has received an impulse which promises to afford many additional remedies to the healing art. When we view the endless variety in the sensible properties of vegetable substances, in conjunction with the improvements

in vegetable analysis, we have every reason to expect the discovery of new and important medicinal agents under a continuance of those researches.

Among the many plants which are scarcely known, except to the natives of South America, to be possessed of high remedial powers, is the Tikimma, a twining shrub found in the vicinity of Surinam, and described by Aublet under the name of *Coucinia.* For most of our information as respects its medicinal powers, we are indebted to a manuscript account by Dr Nassy, in possession of the American Philosophical Society. Dr Nassy was for a long time in Surinam, and appears to have paid much attention to the vegetable materia medica of that country.

Coucinia coccinea. Decandria monogynia. L. Syst. sex. Onagræ. Juss. Nat. ord.

Calyx. Superior, bell-shaped, red, 5-parted, deciduous. *Corolla.* Petals 5, red, acute, ovate, inserted at the divisions of the calyx. *Pericarp,* a berry, 5-angled, almost woody, pulpy within, covered with a white skin.

C. coccinea. Aublet, Plantes de la Guiane, p. 450, t. 179. Lamarck, Encyclop. illus. 359. Jussieu, 320.

Schousbæa coccinea. Willdenow, 857.

The Tikimma is a perennial twining shrub, which is generally found in low swampy situations, having a stem of six or seven inches in diameter at the lower part, and climbing to the tops of the highest trees, from whence its branches hang down covered with leaves and flowers. The leaves are alternate, smooth, coriaceous, ovate and acuminate, with short petioles. The flowers are scarlet, situate at the extremity of the branches in long loose spikes, and are succeeded by a dryish berry, the taste of which is sour, bitter and somewhat astringent. Its colour is yellowish within and green externally; when dried it has a nauseabond taste. Aublet mentions that the Galibis, one of the native tribes, are in the habit of rubbing the noses of their dogs with these berries before commencing a chase, as they are impressed with a belief that this process renders the sense of smell more acute.

The Tikimma appears to possess emetico-cathartic properties in no slight degree, even when applied externally, and is used by the Indians as an application to ill-conditioned ulcers. Dr Nassy details several cases in which he saw it used with complete success. The fruit is to be rasped and applied to the ulcer; in about an hour nausea is produced, followed by copious vomiting or discharges by stool; the ulcer is then washed with a decoction of the leaves of the plant, and cataplasms of them used till a cure is effected, which he observed soon takes place. In one case in which Dr Nassy employed it in an exostosis of the tibia, it induced so violent and long continued a diarrhœa as to almost destroy the patient.

ARTICLE XXVIII.—*On the Preparation of Glauber's and Epsom Salt and Magnesia, from Sea Water. By Daniel B. Smith.*

[The first series of the Journal of Pharmacy, which extended to four numbers only, and was published at long and irregular intervals, having but a very limited circulation in comparison to the present improved form in which it is presented to the public, we have thought that a republication of such of the original papers contained in it as possessed general interest, and were susceptible of practical application, would prove useful to such of our readers as do not possess the original series. With these views we give in the present No., Mr Smith's Observations on the Manufacture of the Glauber and Epsom Salts, and those of Mr Evans on the Black Oxide of Mercury.—ED.]

The fact that nearly all the Glauber's Salt consumed in America is prepared from sea water, and the silence of authors

in relation to this mode of obtaining it, will give interest to the following details. They have been communicated by a gentleman who was formerly engaged in large salt works in Massachusetts, at which all these salts were manufactured.

The brine at these works is pumped into vats of the capacity of six hundred or a thousand hogsheads, where it is concentrated by evaporation in the sun to the strength of a saturated solution. It is then drawn off into a second vat, called the pickle vat, of about half the size of the first, in which it is cleared from impurities, and thence transferred to a third still smaller vat, in which the evaporation is finished and the common salt formed. When crystals of Epsom salt begin to deposite, the mother water is drawn off, and kept under the name of bitterns, for the Epsom salt and magnesia works.

The season for making salt is over by the end of October, and the large vat is then filled with brine, which the sun and high winds of the two succeeding months concentrate to the strength of pickle. This is drawn off into the pickle vat, in which it remains till spring, when it is transferred to the third vat and evaporated to obtain the common salt. During, however, the extreme cold weather, a crystalline deposite is formed, consisting chiefly of sulphate of soda, which is taken out with iron rakes having strainers attached to them, and then purified for sale by recrystallization. The best formed crystals are sometimes dried and sold in their impure state.

The bitterns consists chiefly of sulphate of magnesia and hydrochlorates of magnesia and lime, of which the latter two do not easily crystallize. It is evaporated slowly, and the Epsom salt may, with proper care and washing, be obtained very pure. When evaporated too hastily, it is mixed with hydrochlorate of magnesia, a very bitter and deliquescent salt.

To obtain the magnesia, the bitterns is diluted to a certain standard (upon the strength of which the degree of the firmness and compactness of the magnesia is said to depend) and mixed with a solution of pearl ash. The precipitate is repeatedly washed in water, which is at first hot and gradually cooled,

till it comes off quite tasteless. The box in which it is washed is twenty-five feet in length by twenty feet in breadth, and three in depth, and has a strainer of canvass for a bottom. When sufficiently pure, the magnesia is allowed to thicken, and is then poured into square moulds placed on canvass strainers. When these are full, and the magnesia has obtained the proper consistence, the moulds are lifted off, and the next day the magnesia is removed into the drying oven, where it is kept for forty-eight hours, at a temperature of 190°, then taken out, scraped, and packed up for sale.

In attempting to investigate the rationale of these processes, I shall assume as correct the experiments of Dr Marcet, published in the Philosophical Transactions for 1819. This excellent chemist obtained from five hundred grains of sea water, from the middle of the North Atlantic ocean, having the specific gravity of 1.02886, the following precipitates:

Chloride of Silver, - - -	42 grs.
Phosphate of Magnesia, - -	2.7
Sulphate of Barytes, - -	3.85
Oxalate of Lime, - - -	8
equivalent to	
Chlorine, - - - -	10.356 grs.
Magnesia, - - - -	1.125
Sulphuric Acid, - - -	1.305
Lime, - - - -	.35
Sodium, - - - -	6.037

The state in which these elements exist in sea water is involved in much obscurity. According to the temperature employed in the evaporation, we procure from it either sulphate of lime, sulphate of magnesia, or sulphate of soda. It is therefore evident that a change of temperature is sufficient to disarrange the combinations that usually obtain.

If we suppose the sulphuric acid to exist in combination with soda, the following may be considered as the composition of 1000 grains of sea water.

Sulphate of Soda,	-	-	4.698 grs.
Hydrochlorate of Magnesia,		-	6.4125
———————— Lime,	-	-	1.625
Chloride of Sodium,	-	-	26.27

If it be combined with magnesia, the following arrangement may be considered as obtaining:

Sulphate of Magnesia,	-	-	3.915 grs.
Hydroclorate of do	-	-	2.69325
———————— Lime,	-	-	1.625
Chloride of Sodium,	-	-	30.185

The latter formula agrees better than the former with the medium proportion of salt (which is about three per cent) in sea water. If sulphate of soda be the salt naturally in solution, I know of no law to determine the formation of sulphate of magnesia. If the latter salt be the one ready formed in sea water, the production of sulphate of soda during intense cold will be in agreement with two known laws. One of these is, that solutions of sulphate of magnesia and chloride of sodium decompose each other when exposed to a freezing temperature, as first remarked by Gren. The other is the very remarkable law of solubility of sulphate of soda. At 32° F. 5.02 parts of the dry salt are soluble in 100 parts of water, and 50.65 parts at 102°; whereas the solubility of chloride of sodium is scarcely affected by the temperature. The pickle in which the Glauber's salt forms, is a nearly saturated solution of salt, and remains liquid at zero. At this temperature almost the whole of the sulphate of soda will crystallize. It is therefore probable, that the sulphuric acid exists in sea water in combination with magnesia.

The formation of Glauber's salt cannot be advantageous to the manufacturer. It lessens the production of common salt about thirteen per cent; and though the same quantity of magnesia can be obtained from the bitterns, it will not yield Epsom salt.

It is much to be wished that accurate observations should

be made on the spot, of the composition of the bitterns, and the various phenomena occurring at a salt works. Much advantage would result to the manufacturer in point of economy, and new light be thrown upon an obscure and intricate subject.

Article XXIX.—*Remarks upon the Preparation of the Black Oxide of Mercury. By Thomas Evans.*

The black oxide or protoxide of mercury is the active constituent of the blue mass, or pilulæ hydrargyri of the Dispensatories, the hydrargyrum cum creta, the blue mercurial ointments and plasters, and the black mercurial wash. In all these preparations, except the last, only a small portion of the quicksilver is really oxydized. By long trituration with viscid or fatty substances, the metal is divided into globules so very minute as not to be discernible by the naked eye; yet they may readily be seen with a glass; or they may be rendered visible in the blue pill without a glass, by washing it in successive portions of clear water until the saccharine and farinaceous parts are removed. In like manner, if the mercurial ointment is melted by a gentle heat, and the supernatant oil decanted, a dark blue powder, and a considerable portion of quicksilver will remain at the bottom; the blue powder, which is the oxide, will be found to bear but a small proportion to the unoxydized metal; in the strong ointments, not more than about one-fourth.

The pilulæ hydrargyri, of the Apothecary's Hall in London, where they have the advantage of appropriate machinery, and great mechanical force for exposing every particle of the mass most effectually to the action of the atmosphere, and thus promoting the rapid absorption of oxygen, is, notwithstanding,

far from being certain in its strength. The minute globules of mercury may be readily seen in it with the glass, or separated from it by maceration in warm water.

From one hundred grains of blue pill which had been triturated for many days, twenty grains of running mercury were easily obtained, and numerous globules were still visible in the residuum. This article, previous to washing, presented all the appearances which usually denote the oxydation of the metal, and was pronounced good by those who had employed it in practice. One hundred grains of that prepared at Apothecary's Hall, London, yielded about the same results. The whole quantity of the metal contained in the hundred grains was 33.333 grains; it is, therefore, probable that not more than one-fourth of it was converted into black oxide.

The difficulty and tediousness of the process of trituration, by which the Dispensatories direct the blue pill and ointments to be prepared, have sometimes induced the operator to add a small portion of sublimed sulphur in order to facilitate the extinction of the globules. This, however, changes entirely the character of the compound, forming an imperfect black sulphuret of mercury, and, of course, destroys the value of the preparation. It may be detected by the *black* colour of the pills or ointment, which, if properly prepared, are of a blue colour.

The various strength and the uncertain effects of the different preparations of the black oxide here noticed, render it a desideratum in pharmaceutical chemistry, to discover some process by which the oxygen and mercury may be more directly and intimately combined, so as to produce a compound of equal efficacy with that prepared by the slow and imperfect means of trituration.

The protoxide of mercury was first described with accuracy by Dr Boerhaave, who procured it by enclosing a small portion of the metal in a large, strong phial, and attaching it to the spoke of a mill wheel; the rotation of the wheel kept the metal

in constant agitation, exposing all its particles to the action of the air in the phial, by which means it was converted into a dark blue, or nearly black powder, to which he gave the name of Ethiops per se. He describes it as destitute of lustre, of a coppery taste, and wholly insoluble in water. The length of time required for this process induced the idea of obtaining the oxide by the use of an acid; and, accordingly, the nitrate and mild muriate of mercury have been decomposed by an alkali, in order to procure it. The result is a powder nearly similar to that described by Boerhaave and by Homberg, who obtained it in 1699. M. Guibourt asserts that the compound obtained by this process contains globules of running mercury, which may be seen with a glass, or rendered visible to the naked eye by subjecting it to pressure. It seems probable that the preparation which presented this appearance to him, must have been improperly made, or in some other way defective. Of several parcels which I have prepared, none have exhibited any globules, though examined through a glass of considerable power, nor could any be rendered visible, though the article was subjected to the force of a powerful screw press.

In the last (6th) edition of the American Dispensatory, the black oxide appears to be confounded with the hydrargyri oxidum cinereum, or pulvis hydrargyri cinereus, which is not the black oxide purely, but a compound of this with the triple salt formed by the oxide, ammonia and nitric acid. After directing the oxide to be prepared by boiling the sub-muriate of mercury in lime water, it observes: "when properly prepared it is the protoxide of mercury; but, as frequently found in the shops, it contains a mixture of the triple salt, consisting of oxide, *ammonia*, and *nitric* acid." This could not occur in that prepared from calomel and lime water, because neither ammonia nor nitric acid are employed in any part of the process. The powder prepared with the solution of nitrate of mercury and the water of ammonia, as directed in the fourth

edition of the Dispensatory, is different, both in appearance and composition, from the black oxide prepared by the other alkalies, and it therefore seems proper that it should be designated by a different name.

The Prussian College direct the preparation of an oxide, by precipitating a saturated solution of quick-silver in nitric acid, by the water of caustic ammonia, as long as a black powder is thrown down. But here, again, the triple salt is formed, which mixes with the oxide, and yields only the pulvis hydrargyri cinereus. The operation, though carefully performed, yielded a powder of a beautiful light blue colour, evidently containing a large portion of the triple compound.

After repeated experiments with the different alkalies, the following process has been adopted as yielding a preparation most nearly resembling, in its appearance and effects, the oxide formed by trituration. Take of sublimed sub-muriate of mercury, four ounces; pure caustic potass, four ounces; water, one pound. Dissolve the potass in the water; if any impurities appear, let it stand until the solution is perfectly clear, and then decant; mix the sub-muriate with this, and shake them frequently. Pour off the liquid, and wash the precipitate with water, until the muriate of potass is totally removed; dry the residuum with a very gentle heat.

The American Dispensatory recommends the use of the precipitated sub-muriate of mercury, thoroughly washed, but not dried, instead of the sublimed sub-muriate; but experiments made with the former preparation did not appear to give it any preference over the calomel by sublimation.

The calomel of the shops frequently contains a small portion of the muriate of mercury. When this is the case, on adding it to the solution of potass, an orange-coloured or red precipitate is formed with the black oxide, which injures the preparation. Particular care should therefore be taken not only to procure the best calomel, but also to free it entirely from the muriate by frequently washing it in boiling water. As the

corrosive sublimate is more soluble in alcohol than water, it may be of some advantage to substitute it for the latter, toward the close of the process of edulcoration.

The protoxide of mercury yielded by the process here described, is a fine ponderous powder of a greenish black colour, destitute of lustre or odour, of a coppery taste, and insoluble in water. The relative proportions of oxygen and metal, which enter into its composition, have been variously stated. Fourcroy estimated that 100 parts of mercury were combined with 4.16 of oxygen. Sir Humphrey Davy and Seftstrom give 3.99 as the proportion of oxygen, and the Edinburg Encyclopedia puts it at 5. Chevenix computes that 12 parts of oxygen combine with 100 of metal, and the Portuguese chemists state the composition at 100 and 8.1. Of these various estimates we may assume, as a near approximation to the truth, the proportion of 100 parts of mercury and 4 parts of oxygen.

Of the medical virtues of this preparation, or the comparative effects resulting from its use, and that of the blue pill, it will not be expected that I should state any thing from my own knowledge. Dr Benjamin H. Coates, at whose suggestion the article was first prepared, and who has used it considerably during the last seven months, has politely furnished me with the following particulars. Used as a substitute for calomel, it appears to be more apt to vomit, and to act more as a cathartic, two grains, in almost every instance, operating several times. The largest dose given by him was twenty grains, in a case of puerperal peritonitis, and with success. It appears to act more mildly as (what has been called) a *contra-stimulant*, than calomel. As an alterative, it is, beyond all comparison, preferable to the blue pill, prepared in the ordinary way by trituration, being more certain, efficient, and regular. Half a grain is quite a sufficient dose, to be taken at bed time, and probably one-fourth of a grain might answer the purpose, as this quantity appears to be equal in strength to three or four grains of the blue mass.

From these facts it is evident that the black oxide, prepared with potass, is a valuable medicine, and promises to furnish us with a substitute for the blue pill by trituration, which combines the advantage of far greater facility of preparation, with equal, if not superior, medical virtues.

Article XXX.—*Pharmaceutical Notices, No. 5.*

Ung. Hydrar. Nit. Not having succeeded in making the Ung. Hyd. Nit. satisfactorily, according to the directions of the Pharmacopœia, prepared it 4th Mo. 5th, 1832, by simply adding to ƒ3xij of neat's foot oil, a solution of ʒi hydrargyrum in ƒ3xi of acid nitric. Being mingled together cold and stirred frequently, the mixture became stiff in about four or six hours, and formed a more beautiful preparation than I have before seen, and of a consistence rather softer than red precipitate ointment.

Upon examining the same article after the lapse of nearly six months, it is found to be as soft and unctuous as at first, but somewhat changed to the greenish hue commonly assumed by this preparation. It does not appear to be more rancid than ointments commonly are after being kept a short time.

Camphorated Tr. of Soap. (4th Mo. 25, 1832.) Found upon dissolving one pound of soap (Castile) in one gallon alcohol, that the solution upon cooling assumed the semi-fluid state, nearly like opodeldoc, though not quite so firm. We have hitherto used a small proportion of water, say one third water and two-thirds alcohol, and found our liniment fluid, in which state I suppose this preparation ought to be found.

Coxe's Hive Syrup. Having experienced (as no doubt

others have) considerable difficulty in keeping this preparation without fermentation, I have been induced to prepare it by boiling it to a much thicker consistence than directed by the Pharmacopœia. Having taken the proportion and quantity of ingredients directed, instead of to three *pints*, as there ordered, I reduce the syrup to *two and a half pounds* avoirdupois, to which I add forty grains tartar emetic. I notice in this mode of preparation, however, a difference from that of the Pharmacopœia, inasmuch as in the latter one grain of the salt is added to a *fluid* ounce of the syrup.

Upon reference to the original recipe of Dr Coxe, it will be perceived that he directs that sixteen grains of the tartar emetic shall be added to each *pound avoirdupois*, in which respect the preparation herein mentioned corresponds with his.

If it be deemed more accurate to substitute the fluid measure for that originally directed, the proportion requisite might be easily ascertained, but the article thereby is very materially diminished in strength, as it will be found that sixteen ounces avoirdupois of the syrup, will not *measure* more than ten or twelve, thus making a difference of from one third to one fourth in the quantity of the salt in any given portion of the medicine.

If the fluid measure is adopted, I would propose to increase the quantity of tartar emetic from one grain to one and a half grain to each ounce of syrup.

I should add, that hive syrup, carefully prepared in the manner above mentioned, does not ferment even in the warmest weather. In the preparation of this and some other similar articles, a degree of inaccuracy may occur from the want of *sufficient* direction on what may seem in different points. For instance, in the straining which the decoction for hive syrup is directed to undergo, no specific *kind* of strainer is directed; some, therefore, will probably use a linen or muslin, and some a flannel strainer, and consequently more of the finer parts of the roots used will pass in the one case than the

other; and again what does pass, according to the Pharmacopœia, is *all* to be added to the honey for the formation of the syrup. This, however, will be found very much to diminish its nicety, as the decoction ought to be suffered to stand till perfectly clear, and the clear liquor mixed with the honey. Would it not be expedient to direct what kind of strainer would be most suitable in such preparations, inasmuch as *paper* is specified for filtering?

I am in the practice of using a screw press in obtaining the decoction from vegetable substances. W. S.

Unguentum Tart. Ant. Should not a formula for the preparation of this ointment have been given in the U. S. Pharmacopœia. It is extensively used by some practitioners, and although it can be extemporaneously made, the same reason for exclusion would apply equally well to several of the ointments of the Pharmacopœia, as the Ung. Sulphuris, Ung. Zinci Oxidi, &c. There is also another point in connection with this ointment which deserves notice—it acts with a promptitude in a great measure proportionate to the degree of fineness of the tartar emetic employed in its composition. The best ointment we have seen, was made by making a saturated solution of the salt in water, and precipitating it by means of alcohol; by this process it can be obtained in a perfectly impalpable state.

Ferri Carb. Præcip. The directions given in the Pharmacopœia for the preparation of this article, will not, we think, give a pure carbonate of iron. The sulphate of iron always contains some per-oxide, and when the solutions are mixed as ordered, there will be a precipitation, not only of proto-carbonate, but also of this per-oxide, the former of these being of a greenish colour, and the latter brownish red; the precipitate will be of a dirty green, the proto-carbonate, however, being decomposable in the air; in the process of drying, the carbonic acid in a great measure escapes, whilst oxygen is

absorbed, and the precipitate becomes a reddish brown oxide of iron, in union with a small portion of carbonate.

Potassa. The preparation of this caustic substance, as ordered in the Pharmacopœia, is also liable to objections; the carbonate of potash of the shops is seldom pure, and the consequence is, that the caustic potash obtained from it will be adulterated with sulphates and muriates of potash, lime, silica, &c.; it is true that it does not militate in any great degree against its escharotic powers, but as the object of the compilers of the Pharmacopœia was to present the best formula for each preparation, we would invite their attention to the mode proposed by Mr Donovan (Dublin Phil. Journ. 1, p. 48), for making this article. He uses the crystallized bi-carbonate of potash, and decomposes it by its own weight of lime; this not only affords a potash free from the above mentioned impurities, but also from caustic soda, which often exists in it as usually prepared.

Hydrar. Oxid. Nig. This preparation, as usually made, consists, according to Mr Donovan, of a mixture of metallic mercury and its per-oxide, along with the protoxide; a pure oxide may, however, be obtained by using very finely levigated calomel and a great excess of potash. But it is at best a very uncertain preparation, as a mere exposure to light or to a very gentle heat will decompose it into metallic mercury and peroxide.

Zinci Oxidum. In making this oxide by precipitation with ammonia, care must be taken not to use any excess of ammonia, as there will, in that case, be a loss of some of the precipitate by its being re-dissolved by the free alkali.

Hydrar. Cyanuretum. Chevallier (Manuel du Pharmacien) considers the most economical method of obtaining this salt is by decomposing a per-sulphate of mercury by the ferro-cyanate of potash, filtering the solution whilst hot, in order to separate the iron of the ferro-cyanic acid, and crystallizing the cyanuret of mercury by refrigeration. From 100 of ferro-

cyanate of potash and 200 dry per-sulphate of mercury, he obtained 145 pure, well crystallized cyanuret.

Argenti Nitras. As this salt is decomposed by a gentle heat, the operation of fusing it always causes the formation of oxide of silver, which discolours the preparation. Mr M'Kenna of Dublin (Kane's Elements of Pharmacy) has obviated this, and obtained a lunar caustic of a dazzling whiteness by adding a little nitric acid just as the mass has fused, or by throwing in a few unwashed crystals, containing some acid in excess.

Hydrar. Oxid. Rubrum. This oxide, when prepared by nitric acid, often contains some per-nitrate, from the heat not having been long enough continued. The formula given in the Pharmacopœia will seldom afford a preparation having a fine crystalline appearance. To effect this, the nitrate of mercury should be in small crystalline grains, as left by a tolerably slow evaporation to dryness. These should be placed in a mattrass and heated till oxygen begins to come over, when the mattrass is to be accurately corked, and very slowly cooled. Chevallier lays great stress on these last two points.

Magnesia. Robinet's process for calcined magnesia, it is stated by Kane (O. C.), gives a heavy magnesia like Henry's, and is very economical. He forms a dough-like mass of the carbonate of magnesia and water, presses it strongly between folds of linen, places these masses in a crucible, and calcines as usual. Thirty ounces of magnesia may be made by this process in a vessel which would hold only twelve of the dry carbonate. R. E. G.

Carbonate of Magnesia. The soft and satin like feel of carbonate of magnesia is in a great measure dependent on the precipitant employed to decompose the sulphate. Epsom salts precipitated by the carbonate of potash, never yields a magnesia that is soft and soapy to the touch, whilst, on the contrary, when carbonate of soda is used, the magnesia will possess that quality, and also affords a much handsomer

calcined article, which, if prepared as above directed, will bear a close resemblance to that of Henry.

Solution of Ether. The small proportion in which ether can be dissolved in an aqueous vehicle, has always been a great objection to the employment of this energetic stimulant and anti-spasmodic in mixtures, as from its low specific gravity it will rise to the top of the bottle in a very short time after the mixture has been well agitated, and hence is apt to be administered in too large doses at first, whilst, on the contrary, the residue will contain little or none of it. We are indebted to Dr B. H. Coates of this city for the knowledge of a very simple process, by which this difficulty may be overcome, and the ether kept in perfect suspension in almost any liquid without any change of its therapeutic properties. This consists in adding to every drachm of the ether a small portion of spermaceti, say two grains, and rubbing in a mortar until the spermaceti is perfectly dissolved; then adding the water or mixture, stirring incessantly, and passing it through a piece of muslin to separate the spermaceti. This will give a perfect, and we believe permanent, solution of the ether. Wax, sweet oil, stearine and camphor will afford the same result, though with the camphor the solution is not so perfect as with the other articles. This fact, which may be new to many practitioners and apothecaries, deserves their particular attention. An officinal solution of ether might be kept in the shops, *ad rem natam*, were it not for the property of the ether, when in contact with water, of being converted into acetic ether. Experiments might be made to ascertain how long such preparations might be kept without alteration.

E. D.

Coxe's Hive Syrup. The directions given by Dr Coxe in his Dispensatory for this preparation, are to boil to six pounds, *or to the consistence of a syrup.* The last clause is the important one in the sentence, and its omission in the Pharmacopœia leads to inconvenience. The truth is, the direction

of Dr Coxe to boil down to six pounds is altogether deceptive. It must be boiled down to four pints, which gives a syrup of the proper specific gravity. When made according to the formula in the Pharmacopœia, it has only the specific gravity of 22½ of Baumé; when boiled down one third more, it measures 30°, which is about the proper strength of syrup.

The *Distilled Waters* are imitated in the Pharmacopœia by triturating the essential oils with magnesia and then mixing with water. It is a very convenient and cheap mode of making highly flavoured waters which do not spoil. There is one caution, however, to be observed in their use. A small quantity of magnesia is dissolved, which is sufficient to decompose minute quantities of the salts of morphia, strychnia and quinia. I have frequently found the morphia crystallized in phials which had contained sulphate of morphia, dissolved in the peppermint water of the new Pharmacopœia. A drop of elixir of vitriol to an ounce of the water is sufficient to prevent this.

Plasters. It is now understood that the plasters are true soaps, of which the pro-oxide of lead is the base. The general opinion among chemists is, that the protoxide only can be used, and that water is essential to the preparation of plaster. This, however, is not uniformly the case. If the deutoxide of lead is used, a true plaster can be formed without water. The oxide furnishes oxygen for the acidification of the oil, and is reduced to the state of protoxide, in which it exists in the plaster. The plasters made in this manner are, however, all of a more or less deep brown colour. D. B. S.

Specific gravity of powders insoluble in water. Weigh out 100 grains of the powder, whose specific gravity is to be taken, and put them in a specific gravity bottle (which should contain 1000 grains of distilled water when filled), then fill the bottle with distilled water, and ascertain the weight of its contents, which deducted from 1100, will give the quantity of water displaced by the 100 grains of powder, and as the quan-

tity of water displaced by any substance heavier than water is equal to the bulk of the substance immersed, the relative specific gravity of the substance to water is easily ascertained. Thus if 100 grains of a powder be put into a specific gravity bottle as above, and the bottle filled with distilled water, and its contents should subsequently weigh 1060 grains, it is evident that the 100 grains of powder have displaced 40 grains of water, whence the specific gravity of the powder is easily deduced. As 40, the weight of the water displaced, is to 1000, the specific gravity of water, so is 100, the weight of the powder, to 2.500, its specific gravity, or algebraically thus,

Let a be the weight of the water displaced,
b the sp. gr. of water,
c the weight of the powder,

Then will y be the true sp. gr. of the powder, i. e. $\frac{b \times c}{a} = y$.

To make good *acetic acid* without distillation and free from the sulphurous smell which generally contaminates it when made from a dry acetate and sulphuric acid, the following method may be successfully employed. To 98 parts acetate potass add 150 parts crystallized tartaric acid in powder; mix them well, pour on them 18 or 27 parts of boiling water, and press the mass, when 60 parts acetic acid, sp. gr. 1070, will be obtained. The remaining powder will, by digestion in water, yield a dilute acid applicable to the purposes of distilled vinegar.

The acetic acid thus made surpasses Henry's in grateful flavour, and its smell is perfectly free from the sulphurous one which Henry's possesses.

Morphine. The French morphine contains one-third its weight of narcotine, which can be detected by fusing some over a candle in a piece of paper; if pure, it will not fuse at a degree of heat below that at which the paper browns; if impure, it will fuse like grease. The best method is to dissolve it in sulphuric acid and crystallize it, when, if pure, it will yield white crystals to the last drop of the mother liquor, if

impure, a gummy mass after the first crystallization will occur, which I thought was owing to the effect of the heat employed in its evaporation; but subsequent examination has proved that it was owing to the presence of narcotine.

Sulphate of morphine is, when pure, beautifully white, not at all possessed of a brown shade like that of the French, but is analogous in appearance to sulphate of quinine when in crystals.

Labarraque's Liquor. If this liquor be properly prepared, it will stand at 12 to 12.5 Baumé's areometer. A.

Article XXXI.—*On Labarraque's Liquid. By C. C. C. Cohen.*

A desire that error, apparently sanctioned by authority, should not go forth uncontradicted to the world, and not the mere wish of cavilling, has induced me to pen this communication, in order to rectify the erroneous impression that has already resulted from some inadvertent misconception of the highly talented author of the article entitled "On the Chlorides in general, and especially on those of the Oxides of Calcium and Sodium," page 272, first volume of the Journal of the Philadelphia College of Pharmacy.

With the remarks on chloride of lime, with the exception of the theory there advocated, I entirely agree, but with those on the manufacture of Labarraque's liquor, I will give the particulars of my dissent, and point out where some misconception in the writer has made a material difference in the opinion of Faraday on this celebrated compound. Previous to my doing so, it may be necessary to state that a solution of indigo is not,

nor cannot, by any possibility, be a test of the quantity of chlorine contained in a liquid, and I refer as a satisfactory proof to the article of M. Marozeau, *Annales de Chimie*, xlvi.

The author of the essay referred to (Mr Durand) observes of Mr Faraday that, "in order to obtain this preparation in a state of purity, he recommends this chloride to be made with caustic soda or common subcarbonate of soda, but with a great excess of chlorine, in order to displace the whole of the carbonic acid."

How Mr Durand could have made this error I know not, but certain it is, that Mr Faraday's article, *Journal of Science*, 1827—28, contains at the close of it a decided contradiction to this paragraph, for he states that "Doctor Granville, who had given an account of this liquid in a previous number of the journal, had unfortunately mistaken Labarraque's directions, and by passing chlorine through to complete saturation, had failed in obtaining Labarraque's really curious and very important liquid.

In the commencement of his experiments, Mr Faraday uses certain proportions of common salt, manganese, &c., furnishing a definite proportion of chlorine to a solution containing a definite proportion of carbonate of soda; he next uses an excess of chlorine and drives off the carbonic acid gas of the carbonate of soda, and then operates upon the two solutions alike, and points out their respective chemical differences, which I have thrown together in a synoptical form, and have placed the peculiarities of the two liquids, viz. that made after Labarraque's suggestion, containing as much chlorine as a solution of carbonate of soda could absorb without being decomposed, and without having a particle of carbonic acid displaced, and that made by passing chlorine in excess through a solution of carbonate of soda, until its carbonic acid was displaced, and until the liquid would absorb no more gas. The following are the results. I have not related the experiment, for as each was treated in the same manner, the results will give sufficient indication of their difference.

Labarraque's Liquor, formed with a definite proportion of Chlorine.	*Chloride of Soda, formed by excess of Chlorine.*
Taste sharp, saline, scarcely at all alkaline, a persisting biting effect upon the tongue.	Taste extremely irritating, caustic and strongly *alkaline.*
Evolves but a *slight odour* of chlorine.	Exhales a *powerful* and almost *insupportable odour* of chlorine.
On being heated *evolves no* chlorine.	On being heated *evolves chlorine*, assumes a dingy appearance, after which the taste is saline and astringent.
Furnishes on evaporation a saline mass which has the same *taste* and *smell* as the solution.	Evaporated to dryness furnishes common salt and chlorate of soda, and tastes *dissimilar* to the solution previous to its being heated.
Contains no common salt nor chlorate of soda. Contains all the carbonic acid of the carbonate of soda.	Contains but a very small proportion of the original carbonic acid of the carbonate of soda.
On being acted upon with a view to expel its chlorine, Mr Faraday found that 59 parts out of 60 of the chlorine was evolved, all of which he consequently inferred was available as a disinfectant.	The greater part of the chlorine it contains has entered into composition with the soda and its metallic base, and is consequently not available as a disinfectant.

The other peculiarities of the liquid are perfectly related by Mr Durand in his essay, and I only wonder how his error could have originated. To conclude this portion of the subject, I will add that Turner's theory of Labarraque's liquor is not in compliance with Faraday's results, for Faraday speaks of the carbonate of soda acting as a simple substance in relation to the chlorine, whence I opine that chloride of carbonate of soda should be its scientific name, for that would state the true composition of this extraordinary fluid. For it is certain, however paradoxical it may appear, that the solution of the carbonate of soda which contains the exact quantity of chlorine, will disinfect much more powerfully than a solution of the same salt through which an excess of chlorine has passed, and the reason is found in the fact "that if chlorine be passed through the liquid in such quantities as to decompose the carbonate of soda and drive over the carbonic acid, a solution is obtained containing chlorine and pure soda, which (either on exposure to the atmosphere or standing a short time), in consequence of changes well known to chemists, becomes common salt and chlorate of soda, and possesses no disinfecting powers,

although six times as much chlorine then exists in the solution as in that of Labarraque's—while Labarraque's, on exposure to air, evolves all the chlorine it contains, and none enters into the composition of the remaining salt, and consequently, all the chlorine it contains is available for the purposes of disinfection.

I must differ from Mr Durand, in the supposition that the carbonate formed by the spontaneous evaporation of the liquid chloride of soda (Labarraque's liquor, I presume) is principally produced by the carbonic acid of the atmosphere, the more especially as I find that chloride of lime exposed to the air does not become a carbonate but a chloride of calcium. I have exposed a filtered solution of chloride of lime to the air for a month without any precipitation occurring.

A word or two in reference to Payen's process shall close this article. It is impossible that Payen's process can produce Labarraque's liquid, inasmuch as by the double decomposition ensuing, a portion of the carbonic acid is withdrawn from the soda in combination with the lime, and it is impossible to make a solution in this way, without containing a pretty large proportion of muriate and chlorate, independent of the fact, that the solution can never be as concentrated as Labarraque's. I forgot to remark that Faraday's solution differs from Labarraque's only in being more concentrated, for his solution of carbonate of soda is one-fourth stronger than Labarraque's, and although he uses considerably more materials for generating his chlorine than Labarraque, it must be recollected that he allows one-third to be absorbed by the water used in washing his gas, and that if this deduction be made, it will be found in the exact quantity in proportion to the soda as Labarraque's. A neglect of this sort has produced unpleasant effects here, as for instance, a person of the name of J. Boston made some, according to Labarraque's process, as directed by Faraday, and bottled it as soon as possible after it was made; a gentleman who purchased a bottle, on his arrival homewards opened it, when the "acrid fluid," to use his own expression, was ejected

with considerable force into his eyes, nose and mouth, and produced a high degree of inflammation, which was some days in subsiding; an effect which could not by any possibility take place, except in a badly prepared chloride. I hope the convention will add a formula for making Labarraque's liquid, so that the article sold under that name shall at least be an uniform compound.

SELECTED ARTICLES.

Article XXXII.—*Analysis of the Liquid Styrax from America. By M. Bonastre.*

The liquid styrax from America is obtained from the *Liquidambar styraciflua*, a tree belonging to monoecia polyandria, and to the natural family of the amentaceæ. When recently collected, it is also called liquid amber, from its fluidity and the peculiar yellow colour it possesses. It has an oleaginous appearance, is more or less transparent, a character which, however, depends on the degree of atmospheric temperature. Its taste is acrid, pungent and extremely aromatic. Its consistence is variable, being more or less fluid according to the temperature to which it is subjected; for example, at 50° Fahr. it possesses the fluidity of copaiba, and has somewhat the transparency of that balsam. At the freezing point it becomes very thick and loses its transparency. At a few degrees below this, it is almost entirely opaque, and appears to have a tendency to crystallize; this is owing, as will be seen, to one of the immediate principles which constitute it, and which is very remarkable. Its specific gravity is inferior to that of distilled water, for if a few drops be cautiously poured on that fluid, they spread and remain on the surface. The contrary takes place if it be dropped from a height; in this case it falls to the bottom and does not rise. Only about three-fourths of it were dissolved by alcohol at 33°. This solution feebly and slowly reddened litmus paper. The portion which

was not attacked by the alcohol, was a whitish mass, composed of a great quantity of crystals. Sulphuric ether dissolved it wholly; the solution, however, was not entirely transparent.

Analysis. 100 grammes were introduced in a glass retort with 1000 grammes of filtered water, and subjected to distillation. This operation, which was carefully performed at different times for thirty-six hours, renewing the water as it passed off, afforded 7 grammes of a volatile oil, having the following properties:

Volatile oil. The volatile oil of the liquid styrax is white, diaphanous, and as colourless as distilled water. It is lighter than water, but heavier than alcohol at 33°. Its odour is strong and penetrating. Its taste is acrid, burning and caustic, leaving a disagreeable taste in the mouth. It is very slightly soluble in distilled water, but nevertheless imparts a tolerably strong taste to that liquid.

If the distilled water which was employed to obtain this oil be evaporated in a retort, by a gentle heat, two products will be obtained: 1st, at the commencement, a very aromatic transparent fluid of a strong taste; 2nd, towards the close, and as a residue, a whitish, concrete, inodorous substance, of the consistence of yellow wax, and which, dissolved in ether, reunites by the evaporation of the menstruum in numerous small globules, an almost certain indication of a crystallizable principle. The previous addition of an alkali does not aid the separation of these two products.

Alcohol at 33° only dissolves about one-third of the volatile oil; this solution is always somewhat turbid. It is perfectly neutral, having no action on either litmus or turmeric paper. It is completely soluble in sulphuric ether, and the solution is transparent; concentrated acetic acid does not entirely dissolve it. At 32° Fahr. it completely congeals, beginning at the lower part. In this state it forms a semi-transparent mass like camphor, but does not present a sufficiently distinct crystallization to determine the forms. Nevertheless, when the temperature is raised a few degrees, it is perceived that the

portion of oil which first becomes fluid, leaves a semi-concrete mass, which appears to be formed of the union of numerous fine silky fibres.

If this semi-concrete matter be placed on blotting-paper, the fluid part of it is absorbed, leaving a white opaque substance, destitute of both smell and taste, and which does not appear to present any traces of crystallization. If a solution of caustic potash be added to it, and the whole subjected to distillation, almost all the volatile oil passes over, leaving in the retort only a small residue of concrete matter united or combined with the potash. This combination can be destroyed by means of an acid, and the residuary concrete portion obtained in the form of a very white powder. Exposed to the action of oxygen gas, over a mercurial trough, for a month, at a temperature of about 40° Fahr., there was no absorption of the gas.* Subjected to the action of boiling nitric acid, it was converted into a thick resinous matter, of a gamboge yellow colour; but this action did not give rise to the formation of benzoic acid.

Thus the volatile oil of liquid styrax does not absorb oxygen, nor is it transformed into benzoic acid under the same circumstances as produce these phenomena in the volatile oil of bitter almonds, according to the interesting experiments of our colleagues, MM. Robiquet and Boutron-Charlard. It results from these different experiments, that this volatile oil is composed of at least two substances: 1, of a portion of very fluid and very odorous oil, of a strong taste, and neither uniting with the alkalies nor with oxygen gas; 2, of another portion which is concrete, inodorous, almost tasteless, and appearing capable of uniting with the alkalies. This oil, then,

* The difference in these results induced me to try the following experiment. The volatile oil was introduced under a bell glass filled with oxygen gas, over a mercurial trough, and a small piece of potash added; as no action appeared to be excited, the whole was slightly heated; this occasioned a violent explosion and fracture of the glass.

in some respects resembles those of neroli and cinnamon, so well described by our learned associate M. Boullay.

It still remained to ascertain the nature and proportion of the different elementary principles constituting this oil. M. Henry, Jun. was kind enough to undertake this, and he accomplished it with every possible care and precision, with the following results: 100 parts of the oil gave

Carbon	89.25
Hydrogen	10.46
Oxygen	00.29—100.

It is probable that this small proportion of oxygen was only accidental.

Volatile substances contained in the distilled water. The quantity of water necessary to obtain 7 grammes of the volatile oil, amounted to 5 litres and a half. The distilled water was white and slightly opaline, very odorous, and having a marked taste of styrax. It did not redden litmus paper. 125 grammes agitated with ether afforded 5 grains of a sebaceous, grayish substance, composed, as above mentioned, of an odorous part and one which had no smell. The whole amounted to 11 grammes 1 decigramme.

Liquid residue of the distillation. The fluid that remained in the retort weighed 500 grammes; as it was somewhat turbid, I filtered it. It was of a deep yellow colour, with a weak bitter taste, and a faint smell somewhat resembling that of the sweet vernal grass (*Anthoxanthum odoratum*). It did not redden litmus paper, or did so at least in a very slight degree. This surprised me the more, for having heretofore analyzed some old liquid styrax, I found that the slightest boiling of it in water afforded on cooling a tolerably large deposit of benzoic acid.*

* Some old liquid styrax from the Mississippi, which I analyzed, was so studded with benzoic acid, that it appeared to be entirely formed of it. The specimen was procured through the kindness of M. Robiquet from the cabinet of the School of Pharmacy of Paris.

I evaporated the fluid by a low heat, and observed that as the evaporation took place, there was a formation of a whitish crystalline substance, sometimes of a spherical form, which agglomerated and fell to the bottom of the vessel. I occasionally filtered, to separate the crystals, and obtained 5 grammes 3 decigrammes.

Properties; crystalline substance soluble in water and alcohol. This matter was placed on a filter and washed with a small quantity of cold water. A. About one half was macerated in twelve parts of cold water, which dissolved about one-fifth. This solution, when concentrated, was grainy and of a deep yellow colour. It reddened litmus paper. The other portion, which had resisted the action of the cold water, was dissolved in boiling water and immediately filtered. The crystals that formed on cooling were scarcely coloured. Their smell and faint taste resembled that of the anthoxanthum or melilot. Purified by animal charcoal, they became beautifully white and brilliant, resembling benzoic acid. Nevertheless, their successive solutions in water reddened litmus paper less and less, and finally had no action on it; when placed on burning coals they volatilized and diffused an agreeable balsamic odour. B. The other half was treated with cold alcohol; this menstruum dissolved a part of it; the remainder was treated with boiling alcohol, which also afforded beautiful, brilliant, white crystals. It is remarkable, that when the first impure crystals are removed by washing either with water or cold alcohol, that the subsequent solutions of the purer crystals scarcely redden litmus paper. When examined by a microscope, they are found to be four-sided pyramids.*

Colouring matter. The water, both of the residue and washings, when evaporated, left a very dark yellow matter which congealed on cooling, and which weighed about two grammes and a half.

* Has not this crystallizable substance some relation to *Coumarine* (obtained from the Tonka bean)?

Soluble or oleo-resin. This substance was of a somewhat oleaginous appearance, of a soft consistence, and, nevertheless, adhered to the fingers like a fluid resin. It is perhaps formed of two substances, and may take the place of the soluble resin of the true balsams. It dissolved in highly rectified alcohol, as well as in ether. The alkalies, and even their sub-carbonates, united with it and dissolved it in tolerably large proportions, forming alkaline *savonules*, a product which I was unable to examine in a satisfactory manner, owing to the fracture of the capsule.

Liquid Styrax after distillation. Notwithstanding the prolonged ebullition of the liquid styrax in water (40 hours), and consequently the presumable absence of all volatile oil, it still preserved a very soft consistence; finally, after several other partial ebullitions in an open vessel, its consistence not becoming firmer, I abandoned this experiment. I treated the residue with quick lime mixed with water, boiled, filtered and decomposed it by an acid. The whole was placed on a filter and dried, then introduced into a glass tube and sublimed; this furnished beautiful white and brilliant needles of benzoic acid. This acid had the smell of the anthoxanthum, and although it reddened litmus paper, its taste was much less pungent than that of the same acid obtained from old liquid styrax, from which the volatile oil had not been separated.* I again boiled the residue with lime, but only obtained a few atoms of benzoic acid.

Insoluble crystalline portion. It has been mentioned that cold alcohol did not dissolve the whole of the liquid styrax, but that rather more than a quarter remained unacted upon, presenting the appearance of a whitish mass formed by the union of an innumerable quantity of different sized crystals. These crystals, also, were in the form of tetrahedral prisms, larger

* The pungent taste of benzoic acid, obtained from gum benzoin, and which is felt so strongly in the throat, is perhaps owing to the presence of a volatile oil of this nature; for in old balsams, as in old styrax, for instance, it is difficult to form an idea of the pungent taste of the volatile oil

than those spoken of above. They were wholly insoluble in both cold and boiling water. Cold alcohol dissolved only a very small part. Subjected to the action of boiling alcohol and then filtered, numerous crystals united in spherical masses are obtained, which appear to be similar to those found in the tincture of liquid styrax, and which I called *Styracine*. Thus united, the crystals of styracine are of the consistence of yellow wax. Their smell is analogous to that of vanilla. They are almost tasteless. The form of the crystals is tetrahedral prisms. They fuse below the boiling point of water. They have no action on test papers.

From a comparative examination, which is too long to detail, I became convinced that in the recent liquid styrax, the volatile oil exists in some quantity, whilst the benzoic acid does not exist, or at least in a very small proportion, in a free state; and that the contrary is the case with the old article. Nevertheless, from the experiment with the volatile oil and oxygen gas, it does not appear that the benzoic acid is formed by the mere oxygenation of the volatile oil of this balsam. I must, however, admit that my experiments on this point, have neither been sufficiently varied, nor made with sufficient quantities to determine this important question. Let this be as it may, I must recur to the new principle, *Styracine*, which I had already announced as occurring in the tincture of liquid styrax, and which I have been so fortunate as to also find in the recent balsam.*

* M. Henry, Jun. having also been kind enough to make an ultimate analysis of the pure crystals of styracine, dried in vacuo, they afforded him the following results:

Carbon, . .	76.2728
Hydrogen, . .	5.5032
Oxygen, . .	18.2240
	100.000

Thus it appears that styracine contains only two per cent less oxygen than benzoic acid does. Nevertheless, it does not redden litmus paper, and is wholly insoluble in boiling water.*

* Can it be a kind of hypo-benzoic acid, or a benzoate of bi-carburetted hydrogen?

In fine, it is evident that this balsam is composed of several principles crystallizable at different temperatures, and of other principles, which perhaps are not crystallizable, as the oleo-resin, though my experiments on this point are not satisfactory. The composition of 100 parts are:

	Gram.	Decigram.	
1. A colourless volatile fluid oil, congealing at 32° Fahr.	7		
2. A semi-concrete matter contained in the distilled product, and separated by ether,	11	1	
3. Benzoic acid,	1		
4. Crystallizable matter soluble in water and alcohol,	5	3	
5. Yellow colouring matter,	2	½	
6. Oleo-resin,	49		
7. Styracine,	24		
	—	—	99.4½

ARTICLE XXXIII.—*Observations on Solutions of Opium, treated with a watery solution of Lettuce. By E. Mouchon, Jun. of Lyons.*

The phenomena produced by the addition of certain quantities of the watery solution of lettuce to a watery solution of opium, are so remarkable, as was first remarked by M. Boullay, that we might be naturally disposed to suppose that a great deterioration of all medicinal agents subjected to its influence must be the result. Nevertheless, it appears evident to me, that this action may take place without a sensible loss

of morphine, and I am much deceived if the facts I am about to detail will not fully justify my opinion.

Desirous to know, in the first place, whether it was indispensable to make a watery solution of opium to give the lettuce water the faculty of precipitating the whole of the principles on which it acts, I subjected opium and its extracts, without any intermedium, to the action of distilled lettuce water: after filtering and evaporating these solutions, a manifest turbidness and precipitation took place on fresh additions of the lettuce water, whilst on pouring it into solutions of opium prepared with common water, to which proper proportions of lettuce water had already been added, then filtered and evaporated, but little or no turbidness was occasioned. It is therefore manifest that the precipitation produced by lettuce water in solutions of opium is complete only in cases where this body has been dissolved in common water; and it also appears certain, that it is requisite to employ determinate proportions of these two liquids to produce the full effect. Those which have appeared to me the best calculated to ensure the desired end, will be indicated in the following experiments.

Three pounds of opium of good quality, reduced to powder, were divided into three equal portions, and subjected to the following treatment to extract the morphine:

With common water. After having exhausted a pound of opium by two macerations of twelve hours each in eight parts of water, I filtered and subjected the solution to a prompt evaporation to bring it to two degrees of the areometer; having then added an ounce of purified animal charcoal, (under the influence of which decolorising substance it was permitted to remain for twelve hours, taking care to shake it frequently), and again filtered, neutralization effected by means of liquid ammonia, and some hours afterwards a slight excess of alkali was added to the decanted liquid, and the mixture then left at rest for twenty-four hours. The precipitate, washed with cold water, was then subjected to the action of eight ounces of

alcohol at 8° for a short time, then dried, and triturated with an equal weight of animal charcoal, and afterwards treated with boiling rectified alcohol. After filtration, I permitted crystallization to go on for some hours, then decanted the fluid, washed the crystals till the washings were tasteless, and dried them. The morphine, thus prepared, weighed seven drachms twelve grains, besides what might still remain in solution in the alcohol, in the washings and in the charcoal; it had all the characters of purity, except the presence of a little narcotine.

With affusions of common cold water, after Cornet's plan. A second pound of opium was deprived of its soluble principles, according to Cornet's plan, by three affusions of cold water, and concentrated to the consistence of a soft extract. The fluid, filtered some hours after the last addition of water, four pounds, marked 4°, was subjected, like the preceding, to the decolorizing action of animal charcoal, and in fine, the operation was continued as in the previous experiment. The result was six drachms forty-four grains of pure morphine.

By lettuce water. A third pound of opium was dissolved in four pounds of cold spring water, and the mixture frequently shaken during twenty-four hours. Twenty-four pounds of lettuce water were added, which, having almost instantly caused a very abundant precipitate, I permitted the solution to remain undisturbed for two hours, then filtered it, and reduced it by a rapid evaporation to four pounds; in this state it marked two degrees, and was not rendered sensibly turbid on the addition of cold water. After this, I operated in precisely the same manner as in the preceding experiments. I this time obtained eight drachms thirty grains of morphine, endowed with all the physical characters which denote a pure state of this organic substance. What can we conclude from these three experiments, except that the action of lettuce water on the solutions of opium takes place only at the expense of principles foreign to the combination of morphine, and

in a manner nearly analogous, except more powerfully, to that of common water. This opinion appears to be supported by the following experiments.

Solution of Cornet's extract of opium. A drachm of Cornet's opium, dissolved in four drachms of spring water, produced, in a short time, a greyish precipitate approaching to black, on the addition of three ounces of freshly prepared lettuce water, the virous smell of the opium giving way to that of the lettuce. After remaining undisturbed for some hours, the fluid became transparent, and of a somewhat reddish colour. Being filtered and evaporated to a fourth by a gentle heat, it lost none of its transparency, and on the addition of three times its weight of lettuce water, it did not become turbid, or let fall any precipitate. On being a second time evaporated, and then common water added to it, no change was produced.

Solution of Josse's extract of opium. A rather larger precipitate on the addition of the lettuce water. The physical characters of this precipitate were similar to those already spoken of. The solution itself was of a lighter colour and somewhat less transparent; the only smell was that of lettuce. Evaporated to one fourth, it did not become turbid, it remained limpid, and furnished no precipitate on the addition of three times its bulk of lettuce water. The same was the case on its being again evaporated, and then common water added.

Solution of opium of commerce. This solution, made in the way and in the same proportions as the two preceding, gave in a short time a much more abundant precipitate, of an almost ash grey colour. The liquid was much less coloured than in the second experiment, being somewhat opaline. The same phenomena took place as have already been mentioned on its being treated as in the foregoing experiments.

M. Boullay having remarked that the precipitate resulting from a similar mixture was less abundant than that furnished by the gummy extract, this third experiment is extraordinary,

if this anomaly is not owing to the very great difference that occurs between the opiums of commerce.

Borage, mallow, lily and pellitory water, used precisely in the same way, produce nearly the same results as lettuce water. The same was not the case, however, with plantain, elder, linden or balm water, which, on being added after the concentration of the solution, caused a slight turbidness, and produced a greater or less precipitate.

From what has been said of the property of distilled lettuce water to precipitate the whole of the principles which it is wished to separate from the opium, I think it would not be unadvisable to apply it to the preparation of the extract of opium, and the following appears to me to be the best mode of procedure. I took

Opium reduced to small pieces	500 gram.
Spring water	2000
Juice of the stems of the *Lactuca capitata*	12,000

The opium was macerated in the water for twenty-four hours, and the mixture frequently stirred. Having ascertained that the opium was completely dissolved, I added the lettuce water. After permitting it to remain undisturbed for two hours, I filtered it. Subjected to a rapid evaporation in a water bath, in two basins, and continually stirred, the liquid was reduced to a fourth. The evaporation was then continued in one vessel, and in the water bath over a gentle fire to a pillular consistence.

I have thus several times prepared the extract of opium. The product has appeared to me to be eminently endowed with purely sedative and hypnotic qualities, at least as fully so as those of the extract procured by the most esteemed methods. The quantity of extract obtained has always been six ounces to six ounces and a-half.

By the mere affusion of lettuce water, to which recurrence must be had in following the indications I have laid down, so abundant a precipitate is produced, that the eliminated principles exceed in weight those which result from several affusions of common water; a single trial will fully confirm the

truth of this. Having collected and carefully dried the precipitated matter, I found it weighed seven ounces.

The same precaution having been used in the preparation of Cornet's opium, I only obtained five ounces six drachms of the precipitates, of which four ounces four drachms of insoluble matters remained on the filter after the two macerations, and one ounce two drachms of a blackish resinoid substance were the product of the three affusions.

Previous to these experiments, I had the curiosity to push the operation to an eighth affusion of water, and obtained as a result, six ounces two drachms of extract of opium, and six ounces six drachms and a half of precipitated matters. Certainly all these manipulations cannot be practised without detriment to the properties of the medicine, and yet it is manifest, that two or three affusions are insufficient to deprive opium of all its virous constituents. An examination of the precipitates has also shown the presence of a small quantity of morphine in them, which increases in proportion to the frequency of the affusions; and my experience on this point leads me to believe that by pursuing this operation, the product will be entirely changed, not only from the effect of too long an exposure to the action of the fire, but also from that of the earthly salts contained in the large quantities of water made use of.

It is well known, that the various modes which have been proposed for the preparation of extract of opium, are mainly intended to deprive this therapeutic agent of the oil, the resin and the narcotine which increase its properties. Among these, one only, that of Cornet, appears to rank high, in spite of its inconveniences, as it attains the desired end more completely than the others; nevertheless, it is not, as regards its results, what its author has supposed, for in heating the morphine thus obtained with sulphuric ether, the presence of some narcotine is demonstrated, though in a less proportion than by the process first described in this paper, whilst that

procured by means of the lettuce water is perfectly free from narcotine.

Having taken the six drachms forty-four grains of morphine obtained from the pound of opium treated by Cornet's plan, I extracted from them, by means of two treatments with four ounces of boiling sulphuric ether each time, twelve grains of narcotine in small needle-like and slightly yellow crystals.

The seven drachms twelve grains of morphine extracted in the first experiment, treated in the same way, gave twenty-three grains of narcotine, very pure, though slightly yellowish. As to the eight drachms thirty grains obtained by means of the lettuce water, they only afforded traces of narcotine. From the above it appears

1. That lettuce water exerts no detrimental action on solutions of opium.

2. That it may be a very useful adjuvant in every operation destined to deprive opium of its virous constituents.

3. That Cornet's opium, and probably those of MM. Limouzin, Lamothe and others, which have hitherto been thought to be free from narcotine, contain small quantities of it, and until there be an accordance of opinion as to the effects of this principle, we may reasonably consider all operations as beneficial which are intended to free opium from it, especially as it appears probable that the narcotine is naturally associated with other active principles, especially in the extracts, and may exercise a much more marked effect than isolated.—*Journ. de Pharmacie, Feb.* 1832.

ARTICLE XXXIV.—*Analysis of the Leaves and Fruit of the Tomato (Solanum lycopersicum). By Professor F. E. Foderé and E. Heckt, Strasburg.*

In examining, in September last, the leaves of the Tomato, M. Fodere was struck with their strongly acrid and nauseous odour, which remained attached to the hands. Wishing to examine them more fully, we gathered a quantity, and expressed their juice, which was evaporated over a fire. The fumes which were given out were so powerful that the operator was attacked with vertigo and vomiting, and experienced a sort of intoxication. The thickened juice emitted the same smell, but in a less degree; it became hard from the albumen it contained, and became covered with must; six weeks afterwards this must was removed, and the juice subjected to various experiments; its virous odour had reappeared, and its taste was nauseabond.

1. Mixed with water it restored the colour of litmus paper, reddened by acids. 2. It gave a brick-red precipitate, with hydrosulphate of ammonia. 3. A yellowish white precipitate, with subacetate of lead. 4. An abundant precipitate, with barytes water. 5. An abundant precipitate, with the oxalate of ammonia. 6. The juice was boiled with magnesia, and heated with alcohol at 35°, which became of a beautiful green colour. 7. When filtered it became of a greenish yellow; and, when evaporated to dryness, there was a formation of small bitter crystals, whose nature, from the small quantity obtained, could not be recognised. 8. The matter which remained on the filter was of a beautiful green colour, and when placed on burning coals emitted an animal and ammoniacal odour. 9. This matter, when digested in ether, gave a green tincture, of an odour approaching that of oil of turpentine. 10. This tincture, when evaporated to dryness, left a green fatty matter of a peculiar odour.

Hence these leaves contain an alkaline principle soluble in

water, sulphate of lime, animalized extractive matter, and a colouring substance, which was united to a peculiar volatile oil, soluble in alcohol, and especially in ether; but the small quantities obtained did not permit us to determine the proportions.

Analysis of the fruits. This fruit does not ripen as completely in Alsace as in more southern climates. We weighed three pounds which ripened, though not fully, on the chimney piece. After having crushed and expressed them we obtained twenty-four ounces of juice, half of which was filtered, and half subjected to distillation in a glass retort on a sand bath.

The filtered fluid was of a greenish yellow colour, had a peculiar acid taste, and reddened litmus paper. Having subjected it to various reagents, the following were the results: with oxalate of ammonia, an abundant white precipitate; hydrosulphate of ammonia, a greenish precipitate; lime water, no precipitate; hydrochlorate of barytes, white precipitate; subacetate of lead, abundant white precipitate; nitrate of silver, white precipitate; tartaric acid, white precipitate; hydrochlorate of platina, a slight turbidness. From these experiments we began to conclude that the Tomato contained a peculiar acid, which probably is not free, and sulphates and hydrochlorate of potassa and lime.

The marc was afterwards boiled with a sufficient quantity of distilled water, and, having been filtered, there was found an opaque fluid of a yellowish colour, a nauseous odour, like that of the *Solanum dulcamara*, and of an analogous taste, unctuous to the touch, mucilaginous, leaving on the fingers a volatile oil, which quickly evaporated. The above mentioned reagents were tried on this decoction, and gave us the same results, except that instead of reddening litmus paper, it rather destroyed the colour. This circumstance having led us to suspect the presence of an alkali in this fluid, and moreover the experiments of M. Foderè on others of the *Solanæ*, as the *Datura stramonium*, the *Solanum tuberosum*, the *Atropa belladon-*

na, &c. having demonstrated to him that they contained a peculiar acid united to a base, we wished to discover whether this alkali was a mineral or was an alkaloid. With this intention we boiled the liquid of the decoction, and that which had not been boiled, with a certain quantity of magnesia, to see whether any decomposition took place. However, after the filtration of these liquids, treated by the magnesia, the addition of some drops of sulphuric acid gave no trace of acid, but there was an extrication of a vapour of a peculiar and animal smell, consequently indicating the presence of some kind of acid or its principles, belonging to the organic class. The filtered liquids gave evident proofs of alkalinity, as they restored the colour of litmus paper reddened by nitric or acetic acid; and moreover, tartaric acid and hydrochlorate of platina gave some indications of potash. With a view of obtaining this alkaline substance in an isolated state, we evaporated the solutions slowly in a sand bath to dryness, the residue in the capsules was small, of a brown colour, of a very bitter taste, closely resembling the extract of dulcamara in smell and taste. This residuum, treated with alcohol at 36°, was not dissolved in it in a cold state; on applying heat, the alcohol became of a red brown colour, without however having dissolved all the matter: this alcohol was evaporated, leaving a matter resembling the extracto-resinous substances, of a very bitter taste, and which, on being placed on a burning coal, exhaled an acrid vapour of an animal odour, which irritated the eyes. The marc which remained on the filter after having been boiled, was contracted, hard, of an albuminous nature, and on being put in a crucible and calcined, at first emitted a slight odour of burnt sugar, and afterwards a strong animal smell, with very little residue.

We then proceeded to examine the nature of the marc resulting from Tomatos pressed, without having been exposed to the action of the fire; this was the more interesting as the principal taste of this fruit resides in their pellicle; and, as it would have been useless to subject it to the action of distilled

water or alcohol, we decided on calcining it, to observe what phenomena would present themselves, and what residue would be obtained. For this purpose about twelve ounces of it were put into a Hessian crucible and placed in a furnace. The matter first swelled up, and it was long before calcination was effected; during this process a great many cracks took place in the mass, from which there escaped a gas which burnt with a yellow flame, and exhaled a peculiar smell. The crucible was withdrawn from the fire after two hours calcination, and contained only twenty-two grains of a very dirty brown matter, which was very acrid, and attracted moisture; two ounces of distilled water were poured on it and suffered to remain undisturbed for fifteen hours; the solution which resulted was of an acrid and salt taste, restoring vegetable blues, and giving the following results with reagents: copious precipitate with tartaric acid; slight precipitate with hydrochlorate of barytes; none with oxalate of ammonia or nitrate of silver; whence we concluded that these twenty-two grains were composed of sulphate of potassa and free potassa.

Passing next to an examination of the product of the distillation, it resulted that we obtained from the twelve ounces of the juice of the tomato about six ounces of a greenish liquid, having a strong narcotic odour, and covered with a very thin layer of volatile oil, having a taste which was neither acid nor alkaline, but nauseous, having no effect on litmus paper, and consequently containing no acetic acid, which we expected to find from the acid taste of the fruit. This oily layer was extremely volatile, and we could not separate it from the fluid on which it floated. Having evaporated these six ounces of fluid, we obtained a residuum of two grains only, composed of sulphate of soda, hydrochlorate of lime and soda, in which we discovered no traces of iron.

The marc that remained in the retort produced no change on vegetable blues, thus having no traces of the acid which was so perceptible in the juice. The reagents spoken of above produced the same results with it, and after filtration there re-

mained on the filter a curdy, dense substance, which had the smell of dulcamara. The filtered liquor which had not been exposed to heat was evaporated to dryness, then partly redissolved in alcohol, and partly in ether; both were digested for twenty-four hours, to see if there would be any saline precipitate, which did not take place. The alcoholic solution presented at the bottom a circle of brown matter, extremely bitter, which was examined with the microscope after decantation, but no traces of crystallization were perceptible. The same was the case with the etherial solution. The whole was evaporated, and the brown pitchy or resinous residuum, which was very bitter and nauseous, was put on burning coals, when it swelled up and extinguished the fire, emitting a smell of burnt meat which had become putrid.

Hence it appears that the Tomato contains: 1. An acid, which is not the acetic, but of a peculiar character, which is destroyed by heat, and is united in excess to a bitter principle which is probable analogous to solanine. 2. A volatile oil, which it is difficult to separate, and which rapidly evaporates. 3. An extracto-resinous, brown, pitchy, very odorous matter, having the smell of dulcamara, soluble in water, and partly in ether and alcohol. 4. A vegeto-animal albuminous substance, susceptible of putrid fermentation, like that found in all the *solanæ*. 5. A small quantity of muco-saccharine matter, as is manifested by the smell of burnt sugar during the commencement of its combustion. 6. Sulphate of potassa, a small quantity of hydrochlorate of potassa and lime, of pure potassa, and in all probability an alkaloid, as is attested by the great bitterness of the different products, as well as by the acrid vapour which is exhaled on their being burnt, but which is less abundant in the fruit than in the leaves.—*Journ. de Pharmacie, Feb.* 1832.

Article XXXV.—*Analysis of Balsam of Mecca. By M. Bonastre.*

The tree that produces the Balsam of Mecca has been known from the earliest ages; the name it bears at the present day among the nations of the East, proves, that the balsam is obtained from the same botanical species as formerly. At the same time, the tree furnishing it has been subjected to strange vicissitudes. The first well established disappearance of this plant was during the siege of Jerusalem by Titus, when the Jews, furious and desperate of their cause, destroyed a great number of the balsam trees, which were then principally cultivated at Jericho. The second epoch occurred on the invasion of Egypt by the Turks, and the continual wars which succeeded, in order to establish the Mahomedan religion in the same country.

One of the first modern authors who has given a circumstantial account of the balsam tree, was Mandeville, who was in Egypt under Malek Maudibron about 1335. This author tells us, that in his time, a grove of balsam trees was cultivated in the neighbourhood of Cairo, and the balsam was extracted by means of incisions made in the tree with a sharp stone, or bone, for fear of colouring the balsam.

The second author was Pellegrino Brocardi, a Venetian traveller, who was in Egypt in 1557. This traveller states, when speaking of the garden of the Matare, that about a gunshot from the wells there was a plantation of these plants, which he says are not trees, but shrubs. Finally, Mackrizi also states that, in the territory of Mataria, which formed part of Aus Shem, he met with this balsam, and that it is derived from a small shrub, which is constantly watered from the wells in the vicinity.

From this and other information, it appears that the plant was cultivated in Egypt in certain gardens, and that the oil or balsam obtained from it was sometimes sold at very high

prices to the Christians, who esteemed it greatly, but most frequently it was sent as a present to the princes of Christendom by the successors of Mahomet.

Linnæus has described two species of shrubs which produce the balsam of Mecca or Judea, and arranged them in his genus *Amyris*, designating them as *A. Gileadensis* and *A. oppobalsamum*, without, however, venturing to affirm whether these plants are not mere varieties rather than distinct species. According to Prosper Albinus, the balsam of Mecca is collected in June, July and August; the bark is wounded and the balsam caught in glass vessels. This balsam is then transported to Cairo or Constantinople, whence it is sent to Europe.

I have been so fortunate as to procure two species of the true balsam. The first was given to me by M. Clarion. This balsam had been presented by the Turkish ambassador to Napoleon for Maria Louisa. The second species was sent me by a naturalist, and it appears from a certificate, which has every appearance of being authentic, that this balsam was presented to Ivan III. emperor of Russia, by the Turkish ambassador. I have also recently procured some balsam of Mecca found in an Egyptian tomb. The first of these is what I subjected to analysis, as it was the most recent and authentic, and from its fluidity contained the greatest quantity of volatile oil, the product I was most desirous of examining. Notwithstanding the various attempts to analyse the balsam of Mecca, it is still difficult to fix with precision on a simple and ready mode of recognizing the purity of this balsam. The oldest plan, which is that of Mandeville, is to pour one or two drops in a glass of water, and if the balsam spreads over the whole surface of the fluid, and can be removed in the form of a white pellicle, the article is considered as genuine. This plan, imperfect as it is, is still pursued in commerce. It may happen, however, from the effects of time, that the balsam may become thick, and acquire greater consistence and weight, in which

case this method would not succeed, although it may be practised on genuine balsam.

Analysis. I subjected to distillation 100 parts of recent balsam of Mecca, and after several hours of ebullition in distilled water, obtained 10 parts of essential oil.

Essential oil. This is fluid, colourless, perfectly transparent, specific gravity 0.876; its terebinthinate odour distinct, very agreeable, easily developed, and affecting the sense of smell agreeably without fatiguing it. Its taste is strong, without bitterness, somewhat pungent, fragrant, and leaving by its prompt volatilization a certain freshness in the mouth. Its solubility in cold alcohol is about 1 in 12; the solution is somewhat turbid. Sulphuric ether dissolves it in every proportion, and the solution is transparent. Concentrated acetic acid only dissolves it in very small quantities. Cold nitric acid has scarcely any action on it, and hardly colours it. Sulphuric acid attacks it and gives it a saffron red colour. Exposed to a temperature of 32° Fahr. it does not congeal or assume a crystalline appearance. Soda, potassa and ammonia, are not susceptible of combining with it either in a cold or hot state.

Bitter extract. The aqueous decoction which remained in the retort was very bitter, but little coloured; on evaporation it left four parts of a brown extract of a remarkable bitterness. This extract was partly soluble in alcohol, and communicated to it its bitterness.

Examination of the resinous residuum. The balsam of Mecca from which I had obtained the essential oil was macerated in cold alcohol, until, after several repetitions, the soluble resinous portion was entirely dissolved. This solution reddened litmus paper. Although evaporated till the alcohol had disappeared, this soluble resin never acquired the firmness of the soluble resins of the coniferæ, as those from the Canada balsam and others; on the contrary, it remained in a viscous state without becoming dry and frangible like rosin. Its alcoholic solution reddened litmus paper, and was copiously precipi-

tated on the addition of hot distilled water, which in its turn redissolved a small quantity of this acid. Treated with an equal quantity of caustic soda, it only formed an imperfect combination with that salt, and gave no appearance of crystallization. The same was the case with potassa. When these semi-soaps were decomposed by a solution of the per-sulphate of iron, they gave rise to a blue colour. A similar effect is produced in a greater or less degree on the decomposition of other resinous semi-soaps by the same salt of iron. Ammonia, even after a long contact with this resin, has no effect on it. When this resin was subjected to the action of boiling nitric acid, and the heat kept up for a long time, taking care to renew the acid, but a very slight solution of it took place. The concentrated liquid, when permitted to remain undisturbed for several months, gave rise to no crystalline substance. The acid liquid was strongly bitter, and the undissolved portion formed a tenacious and yellowish pellicle.

Insoluble resin. This substance, which had resisted the action of the cold alcohol, was of a tolerably firm consistence, was without taste or smell, of a whitish grey colour, became soft on the application of heat, and was with difficulty restored to a dry and pulverulent state. It had no determinate crystalline form, but rather resembled thin scales. It was not phosphorescent by friction. Subjected to the action of boiling alcohol, a small portion only was dissolved, it was immediately filtered, and on cooling there was a separation of whitish and viscid flocculæ, resembling those observed by M. Vauquelin. Cold sulphuric ether dissolved it tolerably well, but a slow evaporation of the solution did not give rise to the formation of any crystals. This insoluble matter appears to me to have a very strong analogy to the insoluble matter of the balsam of the *Bursera gummifera*, and which I have named *burserine*, as it not only possesses the external appearance of this substance, but likewise its principal properties.

These experiments, which were undertaken with but small portions of the recent balsam, do not permit me to deduce

more rigorous results, for the old balsam of Mecca, of which I shall presently speak, having been discovered in an Egyptian tomb, is of course of very great antiquity; this balsam was in fact remarkable for two distinct products, which I was unable to isolate, and to recognize but very imperfectly in the recent balsam. These two products are: 1st, a more developed acid; 2d, an already formed and more abundant crystalline matter. As the balsam of Mecca is excessively rare and dear, it is often replaced in commerce by Canada balsam or balm of Gilead, derived from the *Abies balsamea*. The smell alone not always sufficing to distinguish it, I am of opinion that it can only be recognized by the effects of an alcoholic solution. If the two balsams in question be macerated in rectified alcohol, and after several repetitions the solution be evaporated, it will be remarked:

1. That the soluble resin of the balsam of Mecca being always soft, or at least pasty, in no respect resembles the soluble resin of the Canada balsam, which, when deprived of its essential oil, becomes dry and frangible like rosin.

2. The insoluble resin of the balsam of Mecca, from the experiments of M. Vauquelin, and under the circumstances in which he operated, that is, by subjecting it to the action of boiling alcohol; this insoluble resin, I say, being always viscous, and deposited in flocculæ of some tenacity, differs essentially from the insoluble resin of the Canada balsam, which, according to my experiments, is always dry and pulverulent.

Hence, we may lay it down as certain, that the simplest method of recognizing the purity of the balsam of Mecca is by means of alcohol, as this fluid permits us to observe the viscous or soft nature of the two resinous matters.

From the above it is evident that the balsam of Mecca, by the various principles that constitute it, is subject to the same organic laws as many of the resins of the terebinthinate class, and that in arranging these principles in the order in

which they presented themselves in the analysis, we find that the balsam of Mecca is composed of

Viscous soluble resin,	70
Viscous insoluble resin (burserine),	12
Very fluid essential oil,	10
Bitter extract,	4
Acid matter,	3
Ligneous impurities,	1
	— 100

Journ. de Pharm. Feb. 1832.

ARTICLE XXXVI.—*On the Nitrate of Soda of Commerce. By M. Le Canu.*

A note of M. Mariano de Rivero, inserted in the 18th volume of the *Ann. de Chim. et de Phys.* page 442, made known the existence of a large deposit of nitrate of soda, in the district of Tarpaca and Atacama, near the frontiers of Chili. This deposit, which is 50 leagues in extent, and in which the nitrate is found almost pure, must have been worked soon after its discovery, for we find in the "*Nouveau Dictionaire des Sciences Naturelles,*" article "Nitrate of Soda," that since the year 1820, more than 60,000 quintals of the nitrate had been received at the port of Conception in Chili, and that of Yquique in Peru. Nevertheless, it appears that, notwithstanding its great importance, no attention was paid to the discovery of M. de Rivero in France, since, until very lately, the nitrate of soda remained unknown in Paris. It has only been within a few months past that this newly imported article has appeared in the market in any considerable quantities, and that the manufacturers of Marseilles have spe-

cially drawn the attention of government to it. They have been afraid, and not without reason, that the substitution of nitrate of soda for nitrate of potash in certain processes, and especially in the making of nitric acid, would deprive them of sulphate of potash, and consequently render it impossible for them to compete in the manufacture of alum with other establishments in France.

I will not at present undertake to examine how far the substitution of nitrate of soda for nitrate of potash, in the manufacture of nitric acid, would influence the making of alum, or act on the various manufactures in which the nitric acid is made use of. Nor shall I investigate whether the low price of the nitrate of soda might not compensate the manufacturers of nitric acid for the disadvantage they would suffer from obtaining a residue of sulphate of soda instead of sulphate of potash, which bears a much higher price. But as it is certain that the existence of large quantities of the nitrate of soda in commerce must exercise a great influence on certain manufactures, and even give rise to new ones, I have deemed it expedient to examine several specimens of the nitrate with great care.

Analysis has demonstrated, that these specimens were similar in their composition, and may be considered as pure, with the exception of about $\frac{1}{100}$ of hydrochlorate of soda. In fact, nitrate of barytes and oxalate of ammonia scarcely occasioned any change in their solutions, though sufficient to mark the existence of sulphuric acid and lime. A mean of three experiments afforded,

Nitrate of soda,	96.698
Hydrochlorate of soda,	1.302
Water,	2.000
Sulphate of soda, Lime.	a trace
	100.000

According to the notice, however, in the *Dictionaire des*

Sciences Naturelles, it would appear that the nitrate of soda from Peru sometimes contains a notable admixture of sulphate. However this may be, the property which this salt possesses of being much more soluble in water than the hydrochlorate of soda, will permit this latter to be readily separated from it, either by repeated solutions and crystallizations, or by simply washing it with cold water. When thus freed from the hydrochlorate, the nitrate of soda may be employed with more advantage than the nitrate of potash, in the manufacture of nitric acid, from its containing a greater proportion of acid to the base: thus, 100 parts of nitrate of potash are formed of,

Potassa,	47
Anhydrous nitric acid,	53
	—— 100

Whilst 100 parts of nitrate of soda contain,

Soda,	36.84
Anhydrous nitric acid,	63.16
	——— 100

In substituting the latter for the former, the difference of capacity of saturation of the two bases must be borne in mind, and the proportion of sulphuric acid consequently varied; otherwise there would be a risk of not decomposing all the nitrate, or of obtaining only a weak acid.

It is perhaps from not having paid attention to the composition of the nitrate of soda, or to the small quantity of hydrochlorate contained in that from Peru, that some manufacturers have as yet succeeded in making but an acid of inferior quality from it.—*Journal de Pharmacie.*

ARTICLE XXXVII.—*On Mercurial Ointment. By A. Baudrimont.*

The length of time required to prepare mercurial ointment, and the fatigue attendant on the continued and automatic motion which its trituration demands, have induced a number of druggists to search out and describe means to attain the desired result with greater certainty and expedition. Some make use of very viscous substances, such as turpentine and honey, which really favour the extinction of the mercury; others have preferred rancid fat, which *sometimes* succeeds; but pharmaceutical rules being opposed to the introduction of foreign substances in officinal preparations, and the smell of rancid fat rendering it repulsive, and giving rise to new properties, many apothecaries adhere strictly to the legal formula. These latter must often be astonished to find that fresh axunge sometimes readily extinguishes the mercury, and at others appears to have no action on it. A multitude of experiments have been made to discover what difference existed between these two kinds of axunge. M. Simonin thinks that this difference is owing to an alteration, produced by *a matter which he could not isolate*, the presence of which is formed from the effect of humidity. M. Chevallier has indicated a plan which constantly succeeds when fresh axunge is employed. This consists in melting it, pouring it into a bottle with the mercury, agitating them rapidly, and afterwards pouring the mixture into a mortar, where the trituration is continued. The method of M. Hernandes, founded on the same principles, is equally successful. Moreover, we have found that melted axunge poured into a mortar and rapidly shaken until it has solidified, is well calculated to extinguish the mercury in a short time, provided the conditions indicated by M. Desmarest be strictly complied with, viz. that the operation be carried on at such a temperature that the fat shall neither be too fluid nor too solid; either of which would necessarily oppose the

proper division of the mercury; a too great fluidity, because it would not prevent the metallic globules from collecting in one mass; a too great solidity, because it would destroy the viscority of the fat and prevent it from yielding under the pestle. We may also add, that the mercury, although seemingly extinguished, may suddenly appear in the form of globules, from a prompt chilling of the fat, as the latter contracts much on cooling, and permits the mercurial particles to approach each other and become united.

In reviewing what has been said, it is evident that it is not always advantageous to add foreign bodies to the fat or mercury in the preparation under consideration; that rancid fat will not extinguish the metal sooner than fresh; that it sometimes happens, that circumstances occur in which this extinction takes place with rapidity; that these constantly take place whenever the axunge is melted and rapidly cooled whilst it is constantly agitated. The circumstances indicated by M. Simonin not being brought together in this last case, it may be concluded that his explanation is not exclusive, and that having operated on small quantities of axunge, that it cooled rapidly, which allies his observations with our own. We may also add, that the explanation given by this author has been successfully combatted by M. Vivié, who has justly observed, that the vapour of water does not render fat more susceptible of extinguishing mercury.

To discover the theory of the preparation of mercurial ointment, it is necessary to seek what modification the fat may undergo by the fusion, agitation and rapid cooling. In analysing the phenomena, it is seen that a mere fusion and a slow cooling are not calculated to cause the fat to extinguish the mercury with rapidity. The agitation of this fat when solidified is not advantageous, and that fat melted and stirred till it solidified, being again melted and cooled slowly, again became incapable of extinguishing the mercury with rapidity. These facts are not conclusive enough to prove that the sudden alteration of the fat is not of a chemical character; but when

the mechanical explanation which follows is considered, it will be seen that it is sufficient to explain it and to cause a rejection of chemical phenomena. The fat being composed of oleine fluid at common temperatures, and of a great quantity of stearine, which is solid under the same circumstances, this latter not dissolving in the oleine except in certain limits, it results that by a slow cooling it crystallizes and is simply suspended in the oleine, as we see it in olive and rape oil; whilst, if the axunge is rapidly stirred, the crystals cannot form, and the matter which would constitute them remains in a state of extreme division in the oleine.

The crystallized axunge being several times slightly compressed between unsized paper, leaves upon this latter indeterminate but recognizable crystals. The triturated fat, on the contrary, affords only a homogenous mass. We have seen a mass of tallow of 150 kilogrammes entirely crystallized from having been melted, and requiring 48 hours to solidify. It was formed of crystalline spheroids, impregnated with oleine, which were easily separated from each other, as if the tallow had lost much of its consistence. Every one must also have observed axunge, the surface of which was mamillated, the irregularities being owing to crystalline groups.

After having considered the preceding facts, it is readily explainable why fat slowly cooled, being formed of oleine and of stearine in crystals, has not sufficient cohesion to divide the mercury, and that the thickness and solidity of the crystals are opposed to a minute division of the metal which escapes in the interstices of these crystals. The contrary takes place in melted fat, stirred and rapidly solidified.

It must also be observed, that the constituent parts of the axunge, not being chemically combined, are not in invariable proportions, and that the relation of the quantities of the oleine and stearine change not only in different individuals, but also in different classes of animals; the limits of the variation, however, are more restrained in the first case. I am indebted to M. Dupuy for the remark, that in axunge stearine is found

in relation to the oleine in greater quantity in the winter than in the summer, and that this remarkable difference appears to arise from the difference of nourishment of the hogs, as more food is given them during the first of these seasons than during the latter. This being granted, and even confining ourselves to the conditions we have mentioned, and in varying the temperature to obtain about the same degree of cohesion, we must not expect to obtain invariable results.

There is an experiment of M. Simonin which may appear as contradictory to our observations, namely, that where *the fat* in which the stearine was evidently crystallized in a mamillary form *possessed in a high degree the property of extinguishing mercury.* To make this experiment agree with the theory which we have proposed, it is necessary to remark that experiments made with small quantities of mercury and axunge ought not to be compared with such as are made in large masses; because the pestle coming in contact with a large surface of the axunge, rapidly breaks down the crystals, and induces such a state of it as is calculated to extinguish the mercury in a prompt manner, an effect which cannot take place when several pounds of the materials are operated upon. For this reason the extraction of the mercury is always much facilitated, by triturating the mixture with a muller on a plane surface, after having first triturated it in a mortar, or what is always better, having followed M. Chevallier's plan.—*Journ. de Pharm. March*, 1832.

ARTICLE XXXVIII.—*Red Colouring Principle obtained by the partial Dehydrogenation of Alcohol, Sugar, Starch, &c. By M. Rouchas, of Toulon.*

Whenever a mixture of alcohol and nitric acid is subjected to the action of heat sufficient to boil it, and the vessel containing it be then removed from the fire to permit reaction to take place, products are obtained which vary according to the respective proportions of fluids in the mixture.

If the acid and alcohol are in equal portions, the products are azote, protoxide of azote, deutoxide of azote, water, carbonic acid gas, nitrous acid gas, acetic acid, nitric ether, and a substance readily carbonised, a little nitric acid, acetic acid, alcohol and water, which remain in the retort.—(*Thenard.*)

If, on the contrary, the mixture consists of one part of alcohol and three parts of nitric acid, oxalic acid is also produced, as was first observed by Scheele and Hermstadt.

Having lately tried the effect of three parts of the nitric acid of commerce on one part of alcohol at 38°, according to the above described process, I observed not only the formation of the above mentioned products, but also that the alkalies, as potassa, soda, ammonia, and their carbonates, had the property of developing, in the fluid resulting from the reaction, a very beautiful red colour, a fact which I am inclined to believe is new, as no chemical author alludes to it.

I moreover found that this fluid acquired the property of becoming red on the addition of an alkaline substance, only when the reaction was entirely finished; that is, after the emission of a great quantity of rulitant vapours of nitrous gas, and when the ebullition had entirely ceased. In trying the fluid by an alkali at different periods of the operation, it may be easily proved that the colour obtained is intense in proportion as the action of the nitric acid on the alcohol has been prolonged.*

* Sugar, starch, and some other vegetable products, gave the same results under similar circumstances.

I have also ascertained that I could give rise to this colour without having recourse to heat, and found that it was sufficient to pour very concentrated nitric acid (45° to 48°) on alcohol; each drop as it touched the alcohol caused a noise similar to that produced by plunging a red hot iron into water; and it is only when the quantity of acid is about one-tenth to one-eighth of the alcohol, that the mixture enters into ebullition of itself; then the remaining fluid, treated with an alkaline substance, assumes the red colour.

Is this red colour thus arising from the reaction of nitric acid on alcohol, sugar, starch, &c., and developed by an alkali, analogous to that which is formed at the same time as purpuric acid, when this latter is prepared by heating the uric and nitric acids together? We should be inclined to answer in the affirmative, on taking into consideration the experiments of M. Laissaigne, and those of the learned Vauquelin, whose loss we have to deplore. In fact, these chemists have shown that colourless purpuric acid may be obtained, and that the red colour presented by this acid when prepared by the usual method, is foreign to it, and appertains to a peculiar colouring matter.

This being admitted, it may be taken for granted that it is to the portion of ammonia formed at the expense of the elements of the nitric and uric acids, during their reaction and decomposition, that this phenomenon of the production of a red colour is owing, and that this alkali acts, as respects the impure purpuric acid, as the potash, soda, &c. do as regards the sugar or alcohol previously treated with nitric acid.

This reasoning, although plausible, is still hypothetical, since positive facts are wanting to substantiate it. Hence I repeated my first experiments, as well to satisfy myself of their correctness, as to isolate the colouring principle, and to ascertain its nature. Without specifying the methods and substances I employed, I will merely observe that the use of pure charcoal (a plan which perfectly succeeded with Vauquelin, in the separation of the colouring matter accompanying the purpuric acid), afforded me no satisfactory result; the mixture, it is

true, was rendered colourless by the charcoal, aided by heat; but I was unable to separate the colouring matter from this non-metallic combustible body, which led me to think that its constituent principles were easily disassociated. Not being able, therefore, to separate this red principle in a direct way, or to ascertain its chemical constitution, and still believing that, if not identical, it at least had much analogy with that which accompanies purpuric acid, I wished to satisfy myself whether the fluid mixture did not contain this organic acid, an acid whose presence alone in this case would, indirectly, it is true, have led me to suspect the nature of the colouring matter. For this purpose, after having added acetate of lead to the fluid, which formed a copious precipitate, I filtered it, aad washed the residuum left on the filter with cold distilled water; I afterwards mixed it with water, and passed a current of sulphuretted hydrogen gas through the mixture; this was again filtered, and gently heated to drive off the excess of the gas, then treated with pure carbonate of lime as long as any effervesence took place; it was again filtered, but the liquid obtained, instead of containing only the purpurate of lime in solution, afforded a malate of the same base.

From these facts I was obliged to doubt the identity of the red colouring matter in question with that which accompanies purpuric acid, a doubt which was well founded, as subsequent experiments have enabled me to procure this colouring principle in several ways without resorting to any azoted body. Thus:

1. If an excess of chlorine gas be passed into a flask containing sugar and water, and the vessel be permitted to remain undisturbed for twenty-four hours, and this fluid, which has become very acid, be neutralised by potassa, the liquid immediately assumes a reddish yellow colour, which is changed to red on slightly heating the mixture. Bromine acts in the same way.

2. If, to a watery solution of perfectly pure gum arabic, there be added a few drops of a solution of nitrate of silver, the mixture

will gradually assume a beautiful red colour. This phenomenon will instantly take place if the vessel containing the fluid be exposed to the action of the solar rays. This liquid appears of a dirty green by reflected light, and of a rich red by transmitted light.

3. If the same experiment be repeated, substituting sugar and water for the solution of gum, the fluid does not become coloured, and lets fall a precipitate of a blackish colour, which was observed and studied some years since by M. Vogel, of Munich. But if the sugar and nitrate of silver be finely powdered and mixed together, this dry compound will soon become moist, and assume a red colour, which is intense according to the light in which it is viewed.

4. We also know that a mixture of arsenic acid and sugar also assumes a beautiful red colour, which in time becomes so deep as to appear black. Knowing this fact from hearsay only, and not having verified it, I am ignorant of the theory which has been assigned for this phenomenon, as well as the author of the discovery, but I think that the colouring matter thus obtained cannot differ from that produced by the above mentioned methods.

Theory. The chemical composition of the red colouring matter is entirely unknown to me, not having been able to isolate it; but every thing leads me to believe that it only differs from alcohol, sugar, starch, &c., by containing a less quantity of hydrogen. In fact, if the sugar and nitrate of silver when mixed together become moist, before assuming the red colour, must it not be admitted that there is a formation of water at the expense of the hydrogen of the sugar and of the oxygen of the oxide of silver, perhaps even of the oxygen of the nitric acid, for this acid is not of difficult decomposition.

On the other hand, the procedure to obtain this colouring principle by means of chlorine, a combustible body which has the greatest affinity for hydrogen, proves to me that the theory I admit is probable the true one.

As to the solution of gum to which a few drops of nitrate of silver were added, the same theory may be applied to it; for having kept a solution thus coloured for six months, I found that the fluid, without losing its transparency or intensity of colour, deposited some grains of a greyish powder, insoluble in ammonia and in diluted nitric acid, but soluble in nitric acid with a disengagement of nitrous vapours; this solution, on the addition of hydrochloric acid, let fall a white, curdled precipitate, soluble in ammonia; it was therefore metallic silver. This experiment is in opposition to the opinion promulgated by MM. Sementini, Payen and Chevallier on the nature of this precipitate, and supports, on the contrary, that of M. Casaseca.

As regards the action of arsenic acid on sugar, it is probable that the formation of the colouring matter is likewise owing to the partial dehydrogenation of the saccharine principle; in fact, the mixture, before becoming red, is very moist, which I attributed to the deliquescent property of the arsenic acid; but having placed a portion of this mixture under the receiver of an air-pump, and in a perfectly dry air, it still became moist, and afterwards red. What corroborates this view of the subject, is the black colour which this mixture assumes after a lapse of some days, a colour which doubtless is owing to carbon, which becomes more and more predominant.

Finally, during the reaction of nitric acid on alcohol, sugar, &c., it is probable that among other products which are formed, that a part of the vegetable matter, in becoming decomposed at the same time with the nitric acid, yields a portion of its hydrogen to the oxygen of the acid, and is thus transformed into colouring matter.

But a circumstance, in which this red principle is developed, and where I am unable to assign the cause, is the following: if powdered white sugar be put in a test-glass with some fragments of caustic potash, the red colour will be developed, without any visible disengagement of nitrous and rulitant vapours. To explain, in this case, the dehydrogenation of the

sugar by the nitric oxygen, it must be admitted that the nitrous gas remains in solution in the liquid, or rather that a hyponitrite is formed.

I have also ascertained that if the fluid arising from reaction of nitric acid on alcohol be neutralised; for example, if a few drops of nitrate of silver be added, it is merely necessary to throw in an excess of caustic potash to cause a reduction of the metal. This fact appeared both interesting and new, but I have discovered M. Casaseca had ascertained that potassa, soda and ammonia, have the property of precipitating silver in a metallic form, from a vegetable solution, as gum water, infusion of coffee, &c. containing nitrate of silver: this chemist is of opinion that this effect is owing to the reaction of these bases on the vegetable matter, in consequence of which the metallic silver is thrown down, or rather, perhaps, this takes place from the saturation of the nitric acid preventing its acting on the silver. As M. Casaseca does not tell us what principle deoxidises the silver, I am led to conclude, from what has been stated, that this reduction is effected by the carbon of the vegetable matter. There is nothing surprising in this, for we know that if nitrate of silver be mixed with charcoal, and heated to 212° F., a disengagement of deutoxide of azote and carbonic acid occurs, and the silver assumes the metallic state. So, likewise, if a solution of silver, mixed with charcoal, be exposed to the action of the light, a decomposition takes place, with an extrication of carbonic acid and nitrous gas, and the metal is revived. The light is absorbed, there is an elevation of temperature at the spot on which the light impinges, and the same result is produced as if heat had been employed. In fine, I think I may conclude:

1. That nitric acid, in acting on alcohol, sugar, starch, &c. gives rise, among other products, to a peculiar and not azoted colouring matter.

2. That the alkali only acts in the development of the colour, by neutralising the excess of the nitric acid, and in thus disengaging the red matter; for an additional quantity of acid

has the property of destroying the red colour, which, perhaps, can be reproduced by adding a fresh dose of the alkali.

3. That this red principle is chemically composed of the same elements as sugar, alcohol, starch, &c. except that the hydrogen is in a less proportion.

4. That the red colour which is developed in mixing—1, sugar or gum water with the nitrate of silver; 2, arsenic acid with sugar; 3, chlorine or bromine with sugar and water, is identical with the red principle obtained by the action of nitric acid on alcohol, sugar, &c.

5. That nitrate of silver, nitric acid, arsenic acid, chlorine and bromine, act on the vegetable substances above spoken of; the three first by dehydrogenising them by means of the oxygen, and the two latter by appropriating the hydrogen, from their great affinity for this combustible body, and thus giving rise to a hydracid.—*Journal de Pharmacie.*

ARTICLE XXXIX.—*On the determination of the quantity of Urea contained in Urine. By M. L. A. La Cuna.*

Being recently requested by M. Edwards to analyze the urine of a woman affected with dropsy, I adopted the mode of extraction employed by our colleague, M. Henry, Jun. This plan, described in the 15th vol. of the *Journal de Pharmacie*, consists, as may be recollected, in pouring into recent urine a slight excess of a solution of the subacetate of lead, filtering and concentrating the fluid, after having added small quantities of sulphuric acid, until crystals are formed. But either from an error in my operations, or from M. Henry's plan owing its success to circumstances as yet imperfectly appreciated, I was unable to obtain satisfactory results. Forced, therefore, to recur to the old plan, I thought I might take advan-

tage of the occasion to ascertain if it would not be possible, by means of some slight modification, to prevent at least a part of the inconveniences of this plan. In fact, it is well known that in the process of M. Vauquelin, otherwise extremely ingenious, and entirely satisfactory, when it is merely intended to procure urea, that the prolonged employment of heat, the decomposing action exercised by the carbonate of potassa on the urea, and the difficulty of completely separating the salts which accompany it, are so many causes of errors which do not permit an exact valuation of the proportion of urea in the urine, where only small quantities are operated upon.

Now, in reflecting on the singular property which urea possesses of forming a crystalline compound with nitric acid, sensibly insoluble in an excess of the acid, I thought that if this compound constituted, as there was every reason to believe, a true combination in definite proportions, the manipulations, to which were mainly attributed the want of certainty in the results, would become useless. In fact, that it would suffice to collect the nitrate, to dry it, and to determine by calculation the proportion of urea it contained.

To ascertain the composition, I poured into a solution containing 10 grammes of perfectly dry nitrate of urea, and deprived of all excess of acid by two successive crystallizations in distilled water, a solution of sub-carbonate of soda obtained by dissolving 50 grammes of dry sub-carbonate of soda in 400 grammes of distilled water. The fluids, at first acid, manifested a slight alkalinity when I used 42 grammes of the solution. In two other experiments, 10 grammes of the nitrate of a new operation required for their complete decomposition 12½ grammes of the alkaline solution.

Hence it follows that 10 grammes of nitrate of urea decomposed 4.68 of dry sub-carbonate of soda, representing 2.75 of real soda, and consequently that this nitrate constitutes a real compound of definite proportions, formed of

Nitric acid, . .	46.50
Urea, . . .	53.50
	100.00

Consequently, when it is wished to determine the proportion of urea contained in a urine, instead of decomposing the nitrate dissolved in water by the subcarbonate of potash or soda, as has hitherto been done, then evaporating to dryness, and afterwards redissolving the product of the evaporation in alcohol at 40°, it will suffice to evaporate the urine rapidly, till it is reduced $\frac{9}{10}$ of its weight; to filter, when cold, to separate the microcrosmic salts; to pour into the product its own weight of the nitric acid of commerce; to stir the mixture, and to collect on a linen filter the crystals of nitrate of urea, to press them well, and finally to dry them. It is not necessary to wash the nitrate several times, as has been recommended, for by this manipulation a portion of the nitrate is dissolved, especially in the last washings (for the nitrate, deprived of its excess of acid, becomes very soluble), and, besides, it is easy to obtain a salt of a good colour, by mere compression.

The modification of the plan of M. Vauquelin which I propose, ought to permit us to obtain the *maximum* of urea contained in the urine. What at least is certain, is that the proportion obtained by a direct experiment, is a little less than that indicated by calculation. At the same time, I should observe, that even in operating as above recommended, I have never been able to discover in urine the proportion of urea spoken of by Berzelius. The quantity, estimated by that illustrious chemist at $\frac{30}{1000}$ of the weight of the urine, has never appeared to me to exceed $\frac{20}{1000}$ to $\frac{22}{1000}$ even in individuals in the flower of their age and in full health; do such great differences in the results arise from my want of skill or the erroneous mode of analysis I employed? I am unable to decide, for the memoir of M. Berzelius, vol. 79, *Annales de Chimie*, does not indicate his plan of procedure.—*Journal de Pharmacie, Nov.* 1831.

Article XL.—*On the Maté or Paraguay Tea. By M. J. J. Virey.*

This plant, which is a species of holly (*Ilex paraguaiensis*, A. St Hilaire), grows in different parts of South America, especially in Paraguay, and in the inland parts of Brazil. It is known under the name of *yerva maté;* it is more particularly brought from Parana and Uniguay, where it grows spontaneously in the forests or on the borders of water-courses. It is about the size of an orange tree, and has opposite, shining, oblong, serrated leaves; the flowers are in axilliary umbels, and have four petals and as many stamens. They are succeeded by red berries containing seeds.

The leaves gathered for tea are taken from plants of two or three years of age, or when the trunk is about an inch in diameter. They should also be gathered at the proper season, and never in the winter. These leaves are elliptical, somewhat cuneiform, and from three to four inches long; they must be of a bright green and not withered; they are deprived of their petiole, which is hard and ligneous. When they are dried they become fragile, for they are seldom found entire, and it has been supposed that they are purposely broken by the natives, to prevent a discovery of the plant from which they derive it. In this state, however, they are better fitted to make a good infusion. Their smell is not that of the true tea, though somewhat approaching it. The following is the description published by A. St Hilaire, in the *Mem. du Museum d' Histoire Naturelle*, tom. 8, p. 351. *Ilex Paraguaiensis, glaberrima, foliis cuneato-lanceolatis, oblongis, obtusiusculis, remoté serratis, pedunculis axillaribus multi-partitis, stigmate 4-lobo, putaminibus venosis.*

It is also known that tea-like infusions are made from the leaves of several other foreign hollys, which are more or less exciting and intoxicating, as the *I. vomitoria* or *cassine* of Florida, the use of which causes nausea and a temporary delirium.

The leaves of the Maté are prepared for making the tea in the following manner. A long cylindrical furnace is constructed, termed a *barbaqua*, in which a bright fire is made with the dry branches from which the leaves had previously been separated. When this furnace is hot, the leaves are spread on metallic plates so as not to touch each other, and introduced into it. An attendant, called a *quayno*, if expert, will prepare twenty-five pounds a day. The dried leaves are then packed in cotton bags of a large size.

The Portuguese learned from the natives of Paraguay the use of this kind of tea, and soon became fond of it, as it causes a slight and agreeable intoxication. There is a very great consumption of it in South America; the Creoles and Mulatoes are even accused by the inhabitants of Paraguay of having exterminated the natives by the fatigues to which they subjected them to obtain this luxury.

The Maté is generally used in Paraguay, La Plata, Peru, the kingdom of Quito, and the surrounding countries, and the vessel in which it is made scarcely leaves the fire. Besides sugar, a small quantity of lemon juice is added to it when drank; the same leaves will serve for several infusions.

The people of South America attribute the most astonishing properties to this plant, which is called by the Spaniards *yervo de palos*, and by the natives, *caa-cuys*, or *caa-mini*, or *caaguazu*. If it be used in moderation it causes excitement and wakefulness, but, if in excess, it produces drunkenness, and tremors resembling those induced by the abuse of spirituous liquors. Opium causes the opposite effects, and is employed to remedy any ill consequences of the Maté. It appears, moreover, that the *Ilex Paraguaiensis* is not the only species whose leaves are used for Maté, for Martius mentions that the *I. gongonha*, a native of Brazil, has the same properties.

In Mexico they employ the leaves of the *Psoralea glandulosa*, and in Colombia, those of *Alstonia theæformis*, as substitutes for tea.—*Journ. de Pharmacie, March*, 1832.

ARTICLE XLI.—*On the Nature of the Acid which is developed in Rancid Fat, &c. By M. Saladin.*

Among the changes which take place in most substances containing a great proportion of hydrogen, and the new combinations produced by the action of time and the air, in the fatty bodies, is the formation of an acid, which has long been known to chemists, but whose nature and properties have not as yet been the subject of special investigation.

This acid is to be met with not only in rancid oils and fats, but also in the volatile oils, the turpentines and natural balsams, which have been kept for any great length of time. It does not exist in stone coal, bituminous schist, in asphaltum, petroleum or naphtha, which confirms the propriety of making use of this latter substance to preserve the alkaloid metals. The ammoniacal fatty bodies, old cheese, soaps, and plasters, do not present any traces of it, even after their distillation with a fixed acid. Being united with variable proportions of ammonia and water, in old fixed and volatile oils, &c., it is readily extracted by distillation, and one of its invariable properties may be recognised, that of instantly decomposing the hydriodates, setting free the iodine, and giving rise to a new salt, less soluble than the hydriodate operated on, in the form of brilliant, satin-like particles, of a micaceous chatoyant appearance. If more concentrated solutions be operated upon, a flocculent precipitate is formed, sometimes very abundantly, of a more or less deep yellow colour, soluble in a greater quantity of water, insoluble in alcohol at 0.79, and yielding part of its colour to rectified sulphuric ether.

The alteration produced by rancid fat on the hydriodate of potash is already known, and M. Gallard, who appears to have been the first to have remarked it, attributed it to the oxygenation of the potassium contained in the salt in the state of an iodide. The same phenomena occurring with hydriodic acid and the hydriodates, it becomes interesting to search for the

cause, and to determine the nature of the acid which appears to produce it.

Thinking that it might form part of the abundant precipitate which it causes in the solutions of the hydriodates, I tried to extract it, by distilling the precipitate with a great excess of tartaric acid in powder; the acid liquid obtained gave no traces of it. The residue in the retort, which was forgotten for a few moments, became more heated, and spontaneously inflamed with scintillation. The fluid above the precipitate, and the mixture primarily formed, were treated in the same way, but without success. The same product was then several times redistilled over a tolerably large quantity of very old lard, and at last assumed a marked acid character. When evaporated, it did not crystallise, remained without sharpness, and had no action on the skin; it did not disturb solutions of the salts of lime, barytes, or silver; with the subacetate of lead it caused the formation of a basic carbonate; with the washings of essence of turpentine, that of a succinate. When placed in contact with organic colouring matters, it slowly destroyed them, thus accounting for the white colour which is produced after some time in the corks of bottles containing the essential oils, as well as the action of these latter substances on potassium, copper, &c. They continue to act, however, on this latter body, even without being acid; in such case they owe this power to the presence of a variable quantity of ammonia in the state of an acetate, which always exists in rancid grease, &c. It is found in a proportion corresponding to the hygrometrical state of the body, and hence would appear to be owing to the slow decomposition of a small quantity of water, and the combination of its hydrogen with the ambiant nitrogen.

This acid appearing to lose its properties in combining with salifiable bases, forming salts resembling the acetates, and seeming to me to be analogous to that known under the name oxi-acetic, I prepared some of this, which instantly decomposed the hydrosulphuric and hydriodic acids, but there was no formation of the micaceous precipitate, as with the water

distilled from rancid fat. If we attempt to oxygenize the acetic acid by means of the peroxide of barium, by acting, except with the sulphate of silver, as if to obtain the deutoxide of hydrogen, we can readily give it this quality; it even becomes more sensible, by successive precipitations, whilst at the same time it is impossible to modify the acetic acid in such a way as to give it greater density and consistence, or to render it capable of acting on the skin.

Calling to mind the action of the peroxide on the hydriodates, it became easy to foretell of what nature the precipitate would be. After having successively subjected it to the action of nitrate of silver and ammonia, to isolate the iodide, I obtained an iodate, which equalled $\frac{3}{5}$ths of the salt employed. Thus, there exists oxi-acetic acid of a variable density, both free and combined with ammonia, in old volatile oils, and in rancid fatty bodies, and it is to this they owe, among other properties, than of transforming, in part, the hydriodates into iodates and acetates, united with a greater or less proportion of ioduretted hydriodate. The alteration which the salts, as well as the cyanide of potassium, undergo when mixed with acid fats, should lead us to prefer a cerate as an excipient, the addition of an alkali preventing their decomposition but imperfectly. The oxi-acetic acid not occurring in petroleum and naphtha, it becomes possible to recognise their falsification by essence of turpentine. Thus, if we triturate some grains of the hydriodate of potash and water with a little of these adulterated bitumens, a yellow colour will make its appearance towards the bottom, even where there is only $\frac{1}{30}$ of the turpentine, which soon becomes of an orange red if there be more.—*Journ. de Chim. Med.*

MINUTES OF THE COLLEGE.

June 26th, 1832. The Board of Trustees reported the election of John F. Stahl, of Cincinnati, as an associate member.

On recommendation of the Board of Trustees, William Scattergood was duly elected a resident member.

The Board of Trustees also reported that, having received notice from the Professors and Examining Committee that Richard M. Reeve and John Bringhurst, candidates for the diploma of the College, had passed a satisfactory examination, and complied with all the requisitions of the institution, the Board conferred the degree of Graduate of Pharmacy upon each of the above named candidates.

A letter of resignation from Caspar W. Morris was read and accepted.

September 25th, 1832. The Board of Trustees reported the election of George S. Clemens as a resident member, and of Bernard Mesthé as an associate member.

Dr J. K. Mitchell was duly elected an honorary member.

The Corresponding Secretary submitted letters of acknowledgement from the following honorary members.

J. T. Ducatel, M.D.	Baltimore.
J. P. Emmet, M.D.	Charlotteville.
M. Faraday,	London.
John T. Barry,	London.
T. I. Clemens,	Paris.

The semi-annual election of Trustees was then held, when Peter Lehman, A. S. Roberts, Dr G. B. Wood, Joseph Scattergood, William Hodgson, Jun., S. P. Griffiths, Jun., F. H. Smith and S. F. Troth, were duly elected.

MISCELLANY.

Madder.—MM. Gaultier de Claubray and Persoz do not think that the colouring matters obtained either by M. Kuhlmann or by MM. Robiquet and Colin are the true colouring principles of madder. They give the following mode of obtaining the colouring matters of this root, the one red, the other rose colour. Madder, in powder, is to be mixed with a sufficient quantity of water to form a very thin mass; 90 grammes of sulphuric acid are to be added for each kilogramme of the madder. It is to be boiled either over a naked fire, or by means of steam; the transformation of the gum into sugar takes place, after which the madder is readily exhausted of its colouring matters. After this, oxide of tin mixed with a little potash is to be added, when a liquor of a deep red colour will be obtained, which contains the two colouring principles. This liquid is to be neutralised by means of an acid which precipitates the two colouring matters; this precipitate is to be carefully washed, and subjected to the action of alum water, which will take up the rose coloured principle. The residue is to be dissolved in alcohol, and distilled; the substance obtained on evaporation is the red colouring principle; by a spontaneous evaporation it can be obtained in a crystalline form.

On pouring in the aluminous liquid a slight excess of concentrated sulphuric or hydrochloric acid, a beautiful orange red precipitate is formed, which is to be carefully washed; this is to be dissolved in alcohol and evaporated; it is the rose-coloured principle. The red colouring matter is of a brown red, scarcely soluble in cold water, but more so in hot, which does not deposit on cooling. It is not altered by the weak acids; is readily soluble in the alkalies. The acids precipitate it without alteration. It is soluble in alcohol, and still more so in ether; by spontaneous evaporation, it separates in the form of crystalline needles. Alum-water does not dissolve it. Heat decomposes it, giving traces of alizarine. It gives alumed cloths a brick red colour, without brilliancy, but very permanent; it is soluble in the protochloride of tin, the hydrosulphate of ammonia, and the protoxide of tin mixed with potassa.

The rose-coloured principle, when in powder, is of a superb rose colour; weak sulphuric acid has no action on it. The alkalies dissolve it without the assistance of heat. The solution is of a violet colour, which is changed to a yellowish red on the addition of an acid. Left to itself, the alkaline liquor forms a deposit on cooling, as the rose-coloured principle is not soluble in the carbonates when cold. The aluminous salts give a solution of a beautiful cherry red. The rose-coloured prin-

ciple is scarcely soluble in water. Alcohol and ether dissolve it, and permit it to crystallize on spontaneous evaporation. Chlorine destroys it more readily than it does the red principle. Heat decomposes it and gives rise to a little alizarine. The protochloride of tin and the hydrosulphate of ammonia dissolve it. The protoxide of tin, with the addition of a few drops of potassa, dissolves it in all proportions, forming a liquid of an extremely brilliant red colour, which dyes cloths of a beautiful rose tint. It is soluble in concentrated sulphuric acid, which does not alter it.—*Journ. de Pharm. Feb.* 1832.

Lotion for burns.—R. Benzoin, dr. vi.
Storax, dr. iv.
Bals. tolutan, dr. ij.
Aloes, dr. i.
Alcohol, oz viij.

F. S. A. a tincture which is to be employed frequently as a lotion, immediately after a burn has taken place and before a vesicle has formed.—*Journ. de Pharm.*

Colica Pictonum.—Dr. Gendrin, of Paris, has had astonishing success in the cure of this disease by the use of alum and sulphuric acid; he gives them in the following manner:

R. Acid Sulphate of alumine and potassa, oz. ij.
Distilled water, oz. iv.
Syrup simp. oz. ij.

To be taken in three or four doses.

Or—R. Sulphate of alumine and potassa, dr. ij.
Distilled water, oz. iij.
Sulphuric acid, gtts. x.
Essence of lemon, gtts. vi.
Syrup of lemons, oz. ij.

A spoonful to be taken every hour: the patient not to eat for some time before and after taking it.

Dr Gendrin also advises the use of sulphuric acid as a preservative against the attacks of the colic, in the following form:

R. Sulphuric acid, dr. i.
Water, lb. iij.

A glassful to be taken daily, sweetened with an ounce of syrup of gum.—*Journ. de Pharm.*

Maraschino.—It is well known that the cordial called Maraschino of Zara is formed with an alcohol obtained like the *kirschenwasser* from the fermented fruit of a species of cherry in Dalmatia. The word Maraschino appears to be a corrupted abbreviation of *amare cerasus.* To this alcohol agreeable aromatics are added, forming an esteemed cordial. M. Host, a distinguished botanist at Vienna, has described the species of cherry, which under the *Cerasus marasca* is more particularly cultivated for the purpose of making the above mentioned cordial. It is of low growth, and has black fruit.—*Journ. de Pharm.*

Specific gravity of seeds.—MM. Schubler and Renz, of Tubingen, have made

some interesting researches on the specific gravity of seeds, and of the immediate principles of vegetables. They have discovered a remarkable law of nature: that every vegetable produces a seed essentially of the same weight, with slight variations, when in its natural or normal state. There are certain specific and fixed limits, as in the size of many animals, especially insects; varieties in climate or nourishment may cause an increase or diminution of size, but the proportions remain the same. It appears, therefore, that animal and vegetable forms are subject to certain laws, like mineral or crystalline bodies. Of all seeds, those which are specifically the lightest are the oily, and which generally swim on the water; the heaviest are those filled with fecula, they are even heavier than the ligneous. Every genus, every species, is constant in the weight of its seeds (in an uncultivated or natural state.) The lightest seeds are those of the *umbelliferæ and compositæ.* The seeds of resinous trees are lighter than water. It was not, therefore, without a just foundation that the first weights established by the ancients were based on certain seeds (barley in the East, rice in India, and maize among the Peruvians). The heaviest flour is that of the potato, and the lightest that of the palm.—*Journ. de Pharm.*

Separation of some metallic oxides in chemical analysis.—To separate oxide of iron from that of manganese, Mr Liebig boils the saline solution of these two oxides either with carbonate of lime or carbonate of magnesia. The precipitation is so complete that no traces of iron can be found in the fluid, and the precipitate does not contain the slightest trace of the oxide of manganese. This method, which also is successful in separating the oxide from the oxidule of iron, has nevertheless one objection: that the solution of the protoxide of iron becomes very turbid even when filtered, but this only takes place when the analysis has been made with carbonate of lime. Magnesia leaves a limpid fluid which does not become turbid, doubtless, because the magnesia forms a double salt with the protoxide of iron, which is less decomposable. The carbonate of lime, on the contrary, is the only reagent which should be used to precipitate oxide of iron from its mixture with the oxides of nickel and cobalt. Magnesia would precipitate all the oxides, and the same would take place with the carbonate of barytes. The carbonates of lime, barytes and magnesia, boiled with salts of lead or bismuth, completely precipitate their oxides. In cold solution, carbonate of lime precipitates bismuth only, whilst the lead remains in solution.—*Ibid.*

Chromium.—To obtain this metal, Mr Liebig heats to redness in a glass tube a triple combination of the chloride of chromium with ammonia, and passes a current of ammoniacal gas through it. Metallic chrome is obtained in a pulverulent state, of a black colour, becoming bright under the burnisher, and burning at a red heat. Chromium may be obtained by a still simpler process, by reducing the chloride of chromium by ammoniacal gas; this gives a chocolate brown powder. The chrome thus prepared is altered at a red heat, but does not afford a green oxide. *Ibid.*

Modification of tartaric acid.—Mr H. Braconnot has observed a remarkable property in tartaric acid. This acid, when heated violently for a few moments, swells up and leaves a dry, transparent substance, which can be drawn out into very

fine threads whilst hot. After this operation, the acid has lost 0.087 of its weight, is uncrystallizable and very deliquescent. Carbonate of lime, when added to its warm solution, does not form a precipitate of crystallized carbonate of lime, but the fluid gradually becomes turbid on cooling, and deposits a pitchy, mucilaginous, transparent insipid mass, which is ductile between the fingers like turpentine. This calcareous salt, when dried, resembles gum arabic. Hot water restores it to its former appearance. An excess of acid redissolves it, and the solution evaporated to dryness, leaves a fragile, acid salt as transparent as a varnish, which, after being sometime in contact with cold water, again affords a sandy precipitate of common tartrate of lime. The modified tartaric acid forms uncrystallizable salts with magnesia, soda and potassa; and excess of acid precipitates the solution of potassa in an insoluble form, which has nothing of the common granulated form of potassa.—*Journ. de Pharm.*

Morphine.—M. A. Galvini has given a new method of obtaining this salt free from narcotine. His plan is a modification of that of M. Guillermond of Lyons. It consists of reducing an alcoholic solution of opium to the consistence of an extract by evaporation; then, by successive solutions and filtrations, separating all the resinous matter of the extract, so as to isolate the narcotine from the morphine; a somewhat prolonged boiling with calcined magnesia, and subsequent filtrations, washings and dryings, will afford very pure morphine completely free from narcotine. As to the resinous matter, by dissolving it in diluted sulphuric acid, then decomposing the solution by potassa, the narcotine is precipitated, and can be purified by a fresh solution in sulphuric acid, by means of ammonia, and after having been filtered, washed and redissolved in alcohol at 24°, it can be crystallized. In operating on a pound of opium, M. Galvini obtained eight drachms of perfectly white and well crystallized morphine —*Bib. Universelle.*

Formation of carbonate of lime under the influence of sugar.—Daniel concluded from his experiments, that when an aqueous solution of lime in sugar is left undisturbed, that the latter is destroyed and converted into a mucilaginous substance, whilst the lime precipitates in the state of a carbonate in the form of very acute rhomboids. M. Becquerel has obtained the same kind of crystals by means of weak electric currents, and as he operated in vacuo, the decomposition of the sugar is rendered certain. M. Pelouze concludes from additional experiments which he has made on this subject, that when the operation is carried on in the air, that the sugar undergoes no alteration, and that the crystals which are produced result from the action of the atmospheric carbonic acid on the lime. The action of the sugar is limited to presenting the lime to the carbonic acid, and the carbonate forms slowly in the midst of an aqueous fluid. It contains five atoms of water of crystallization; at 95° to 100° it gives it out and becomes pasty, but what is very remarkable, is, that the salt, which becomes completely free from water of crystallization at 100° whilst in the fluid, only loses two atoms when it is boiled in strong alcohol. The new salt of three atoms of water is efflorescent, whilst that with five is not altered —*Journ. de Pharm.*

Mercurial ointment.—M. Calloud, of Nancy, states that by the following plan he has never failed in obtaining an excellent mercurial ointment very rapidly. Melt

together one pound of very pure mutton suet and two pounds of axunge and leave the mixture to cool for twenty-four hours. A third of this mass is then to be taken and triturated in a mortar for a quarter of an hour, adding the mercury very gradually; when the proportion of mercury has been added, mix another third of the fat, again triturate for a quarter of an hour, then add the rest of the fat, and continue the trituration.—*Journ. de Pharm.*

New principle in opium.—M. Bebert, of Chamberry, states that he has obtained another bitter principle from opium, which is crystallizable, forms salts with the acids, especially with the acetic; this crystallises in very white scales, its sulphate forms very white silky crystals. About four months since, he goes on to say, wishing to ascertain if the residue obtained in dissolving the opium of commerce in water to obtain the extract containing morphine and narcotine, and after having exhausted the residue by several affusions of water, he heated it several times with ammonia at 5° until that fluid was scarcely coloured; he then perceived at the bottom of the vessel small crystals, which were very white and brilliant. Having collected them on a filter and afterwards treated them with boiling alcohol, he obtained a fine group of crystals which he thought were morphine or narcotine, but further experiments proved that they were composed of narcotine and a principle not soluble in ether. He again treated them with boiling alcohol, and on the solution cooling, obtained acicular crystals which had none of the chemical characters of morphine. He obtained this substance, 1st, from the residue of the extract of opium dissolved in water: 4 drachms gave him 16 grains of narcotine and 8 grains of the new principle; 2d, from the residue of 4 ounces of opium of commerce, exhausted by water, he obtained 14 grains of the new principle and 8 grains of narcotine; 3d, from 4 drachms of the dry residue of the opium of Rousseau he got 6 grains of the new principle, and 10 of narcotine.—*Ibid.*

First discovery of Hesperidine.—Gaubius, in his *Adversaria Varii Argumenti*, Leyden, 1771, states that he observed in some volatile oil of orange flowers, of about twelve years old, a crystalline substance, in small, aromatic, tender scales, having no acridity, soluble in water and spirits of wine, fusible at a low temperature, volatile without being inflammable.—*Ibid.*

Cajeput oil.—At a meeting of the Society of Pharmacy of Paris (14 Dec. 1831) M. Planche stated that the specific gravity was not, as had been asserted, a certain criterion of its purity; as mixtures of oil of turpentine with some of the other volatile oils could be made of an identical gravity.—*Ibid.*

Hydriodate of phosphuretted hydrogen.—Mr Serullas laid before the Society of Pharmacy of Paris (April 1832) specimens of this substance in large and beautiful crystals. He stated that it was easily procured by distilling a mixture of 15 parts of phosphorus and 60 of iodine triturated with pounded glass and moistened with 8 or 9 parts of water. The crystals obtained after the condensation of the gaseous products were exposed to a gentle heat in a vessel of proper size, and sublimed. This substance crystallizes in diaphanous cubes, is decomposed by water, forming hydriodic acid and proto-phosphuretted hydrogen. It volatilizes and may be passed through a heated tube without being decomposed; its vapour, however, is readily

inflamed by contact with an ignited body. Concentrated alcohol, with the aid of heat, transforms it into hydriodic ether and phosphuretted hydrogen gas. When heated with the nitrate of silver, it is transformed into iodine and phosphate of silver. With the cyanides of mercury or potassium, or the chlorides of mercury, there is a formation of ioides, hydrocyanic or hydrochloric acids, and proto-phosphuretted gas; finally, with sulphuric acid it forms several compounds, first, sulphurous and sulphuretted hydrogen gasses, then a precipitate of iodine, sulphur and phosphorus, which partly remain in solution, and of hydriodic acid which the excess of the sulphuric acid successively decomposes.—*Journ. de Pharm.*

Iodic acid.—The same chemist also exhibited a bottle containing crystallized iodic acid, which he obtained with facility by heating iodine with nitric acid, charged with deutoxide of azote. He stated that he first tried the plan of M. Misterlich, by nitric acid alone, and after a very long operation, obtained only a small portion of iodic acid.—*Ibid.*

Soluble mercury of Hahnemann.—M. Mornheim is of opinion that the following process will always afford a similar product, of a deep black colour. On 3 ounces of mercury pour 4 ounces of nitric acid of 1.28°, diluted with 6 ounces of distilled water; heat and gradually raise the temperature until about two-thirds of the mercury is dissolved. The solution is then to be diluted with a pint of distilled water, filter rapidly whilst hot, so as to prevent the deposition of crystals, and add to the filtered fluid 4 pints of distilled water. An ounce and a half of ammonia of 0.95 diluted with 8 ounces of distilled water is then to be added as quickly as possible, constantly stirring the mixture, and then the supernatant fluid quickly decanted from the precipitate, which is to be well washed and dried in a dark place. If the ammonia be not rapidly added it reacts on the precipitate, forming an ammoniacal deuto-nitrate of mercury. There is a reduction of a part of the mercury, and the colour becomes greyish. For the same reason, the precipitate must not be left for any time in contact with the liquid.—*Geiger's Journ.*

New substance obtained from opium. By J. P. Couerbe.—In 1830, having charge of the chemical operations at the laboratory of M. Pelletier, I obtained, in treating opium to procure morphine, a substance which appeared to me to be new; I apprised M. Robiquet of it, in a letter, which I had the honour of addressing to him; since that time this substance escaped me, until aiding M. Pelletier in an analysis of opium, I again found my substance, which I am now always able to procure. When pure, it is perfectly white and in needle-form crystals. It is soluble in boiling water, ether and alcohol, and crystallizes equally well in either of those fluids. It is easily fused, the temperature of boiling water being sufficient to melt it; hence the first effect of this liquid is to transform it into a kind of oil, which soon dissolves when the water is in a sufficient quantity. When heated in a small bent tube, it melts, and when this operation is carefully performed, becomes perfectly transparent; a temperature rather more elevated than that at which it fuses gives it a yellow tint, distils the greater part of it over, leaving a slight carbonaceous residue. Distillation does not appear to change the nature of this substance, for the above mentioned solvents restore it to its crystalline state. Finally, this substance, to which I give the name of *meconine*, when burnt with the oxide of copper in a proper apparatus,

gives out only pure carbonic acid; this is an essential character which distinguishes it from the substance discovered by M. Pelletier, from narcotine and from morphine. It also possesses a marked acridity which leads me to think that it will exercise some action on the human system.*

[On the reading of this before the Society of Pharmacy, we find from the published abstract of their minutes, that M. Pelletier announced that he had obtained another crystalline substance from opium, differing from any hitherto found, and especially from the meconine of M. Couerbe. This substance is white, inodorous, and crystallizes in an acicular form. It contains azote. It is soluble in water and alcohol, especially when aided by heat, and on cooling again assumes a crystalline state. It is insoluble in ether. When added to a mineral acid diluted with a sufficient quantity of water, so as not to act in a direct manner on its elements, it assumes a blue colour. The proportions are equal quantities of hydrochloric acid and water, 2 parts water to 1 of nitric acid and 4 parts water to 1 of sulphuric acid. This substance does not strike a blue with the salts of iron, nor a red with nitric acid. M Pelletier proposed to give this substance the name of *narceine.—Ed.*]

On the preparation of the iodides of barium and strontium. By M. Henry, Jun.—Since chemistry has recognized the existence of iodine in a number of substances and mineral waters, whose success in certain affections were fully ascertained, the greater part of these good effects have been reasonably attributed to this singular body; and medicine has since made a happy use of this article, both alone and in a state of combination. Among those most generally employed, are the iodides of potassium and of mercury. Other iodides have also been proposed in certain cases, and I have more than once had occasion at the central pharmacy to prepare those of calcium, barium and strontium, iron, &c. at the request of some physicians of the hospitals. The three first, as is known, may be made either by saturating the oxides or carbonates of these alkaline metals by means of pure hydriodic acid, or as has been indicated by the 13th vol. of this journal, by the action of these hydrated carbonates on a solution of iodide of iron; after a proper evaporation the iodides are obtained, but these methods require complicated anterior preparations, and the want of solubility of the above mentioned carbonates, renders it difficult to attain the point of exact saturation without great trouble. Having had to prepare a certain quantity of iodide of barium, and wishing to avoid these inconveniences, I pursued the following plan, which is not unlike that of M. Fau, for the preparation of iodide of potassium.

It consists in decomposing, with care, a solution of the hydrosulphate of barytes by the tincture of iodine; for this purpose, after having treated by hydrochloric acid, and washing a quantity of sulphate of barytes, reduced to a fine powder, this salt is to be mixed with about one-sixth of some very decomposable otganic substance, as starch, sugar, oil, &c.; the mixture is to be well calcined, and pure boiling water added to the residue, then rapidly filtered or decanted, with as

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* The reading of this account recalled to my mind that M. Dublanc, Jun. presented, about four years since, a memoir to the Academy of Medicine, the object of which was to describe a new substance found in opium. This memoir having been consulted, M. Couerbe acknowledged that his meconine was identical with the substance discovered by M. Dublanc.—*Robiquet.—Journ. de Pharm. Feb.* 1832.

little exposure to the air as possible. To the solution is then to be added a very strong alcoholic solution of iodine, until a milk white precipitate is no longer formed; it is then to be filtered and evaporated, as is about to be described.

At each affusion of the iodic tincture, a white precipitate is to be remarked, which disappears when the hydrosulphate of barytes predominates, which then produces a greenish tint; the precipitated sulphur is no doubt redissolved in the salt, and induces another degree of sulphuration. The hepatic odour is, moreover, very disagreeable, above all mingled with that of alcohol.

When the proper point is reached, the filtered liquid being limpid and colourless, it must be evaporated by distillation (if large quantities be acted on), not to lose the alcohol, which may serve for similar operations. It is to be concentrated almost to dryness, diluted with a little water, and rapidly filtered through unsized paper, then very rapidly evaporated to dryness in a matrass or phial, so as to permit but a very small portion of air to come in contact with it as long as it is in a state of ebullition; the vessel is to be broken, and the iodide will be obtained in a greyish white mass formed of silky needles. This salt is very deliquescent, very soluble in alcohol, is precipitated by the sulphates; when heated in contact with atmospheric air it gives out iodine, when in contact with sized paper it decomposes in part, and turns the starch of the size blue. By pushing the evaporation to a degree less, the liquid crystallizes on cooling in very distinct acicular prisms, that may be collected after having drained off all the fluid from them.

The iodide of strontium was obtained in the same way; its colour was more yellow. When dissolved in alcohol it communicated to the flame of that body the usual purple colour characterizing the salts of this base.

N. B. It might perhaps be possible to prepare the bromide of barium by a similar procedure, in making use of a newly made tincture of brome.

The iodide of barium obtained by the above mentioned process was analyzed. one gramme well dried in a tube afforded results agreeing with its theoretical composition.

Barium,	35.17
Iodine,	64.83
	100.00

Journ. de Pharm. March, 1832.

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Ch. I. Lith.